

7-28-2006

Volume Two: State Standards Highway Design Guide, 2006

Maine Department of Transportation

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Volume Two

State Standards HIGHWAY DESIGN GUIDE



MaineDOT

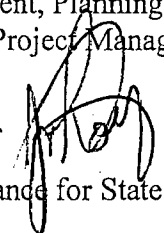
State of Maine
Maine Department of
Transportation

John E. Dority
Chief Engineer
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Augusta, ME 04333-0016

Phone: (207) 624-3000
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Memorandum

Date: July 28, 2006
To: Directors of Project Development, Planning,
Maintenance and Operations, Project Managers
and Traffic Engineers
From: John E. Dority, Chief Engineer
Subject: Update of Stopping Sight Distance for State
Standards



I presented an update in the subject standard to the Engineering Council on July 27, 2006, and it received no objections from those present.

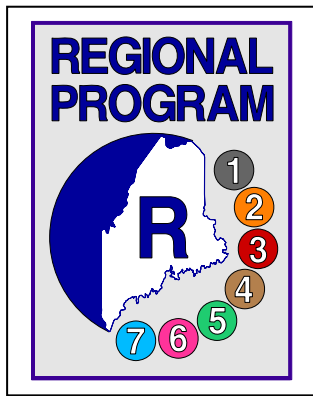
The update presented was to revise the Stopping Sight Distances in the State Standards to the distances listed under "Design" in Exhibit 3-1 Stopping Sight distance, page 112 of AASHTO A Guide on Geometric Design of Highways and Streets 2004.

With the obstacle in the road increasing from 6 inches to 24 inches in height, in the SSD definition, we need to be in compliance with the newest sight distance requirements.

Please inform your personnel of this update, and that these new Stopping Sight Distances are to be used on all State Standards Design Governed Project, except those on which the vertical geometrics have been finalized.

The State Standards Design Guide should be revised to reflect this change ASAP.

JED/rtr



STATE OF MAINE

Department of Transportation

#16 SHS, Child St.

Augusta, Maine 04333-0016

Regional Program

JEFF ADAMS, PROGRAM MANAGER

ROBERT WATSON ASSISTANT PROGRAM MANAGER

TEL: 624-3470 FAX: 624-3471

MEMORANDUM

TO: John E. Dority, Chief Engineer

FROM: Kenneth Sweeney, Director
Project Development

DATE: August 14, 2003

CC:

RE: First Revision of State Standards

Please be advised that the State Standards Design Guide has been reviewed due to the changes going from Metric back to Imperial measures. This is the first complete revision. This Design or Guide is constructed to allow for future revisions and additions as program and policy changes may require.

Department of Transportation

Department of
Transportation

Phone: 287-2171
FAX: 287-2144
e-mail:

Memorandum

To: John E. Dority, Chief Engineer
Warren T. Foster, Director *WF*
Project Development

From: 2000 Task Force on State Standards

cc:

Date: Wednesday, Sept. 6, 2000

Subject: Final Draft Recommendations

Please be advised that the group you charged with reviewing current design standards and recommending State standards for non-NHS highways has completed its review and hereby submits its Final Draft recommendations for approval and adoption.

These standards are to apply to all State roadways not on the National Highway System. These systems are minor arterial, major collector, and newly developed standards for minor collectors to fulfill requirement of the new urban and rural initiative program (URIP). This State Standards Highway Design Guide, should be used during the planning, design and construction of non-NHS Highway projects.

A draft report was distributed for comment to the various units within the Department. Comments were submitted to the Task Force for consideration. A special Task Force meeting was convened to discuss each comment received and to incorporate any agreed changes into final draft.

The Task Force believes the Department should continue to be open to ideas and recommendations that will make our operations more effective. This design guide is constructed to allow for future revisions and additions as program and policy changes may require.

Ref. 2000 Task Force on State Standards
APPROVED ☒
RECOMMEND APPROVAL ☐
CONCUR ☐
NOT APPROVED ☐
[Signature]
CHIEF ENGINEER
09/08/00
DATE

Warren T. Foster
Approved

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SECTION A

Introduction

In 1995 Standards for Maine Non-NHS Highway Systems were developed in response to ISTEA REGULATIONS ALLOWING States to establish their own standards for roadways not on the National Highway System. It has been five years since these standards were approved and adopted by the Department. Therefore a Task Force was appointed by the Chief Engineer to revisit the standards and also develop standards for the Minor Collectors in light of the recently adopted Urban and Rural Initiatives Program (URIP).

Members of this Task Force were:

| | |
|----------------|---|
| Jeff Adams | Bureau of Project Development |
| Dave Bernhardt | Bureau of Project Development |
| Gail MacMunn | Bureau of Project Development |
| Brian Burne | Bureau of Project Development |
| Scott Rollins | Office of Environmental Services |
| Norm Haggan | Bureau of Maintenance & Operations |
| Galen Costigan | Bureau of Maintenance & Operations |
| Gerry Audibert | Bureau of Planning, Research & Community Services |
| Dale Peabody | Bureau of Planning, Research & Community Services |

The purpose of the State Standards Task Force is to revise/redevelop the minimum design standards that may be applied to minor arterials, major collectors and minor collectors throughout the State of Maine. The Task Force is expected to minimize project impacts by defining an acceptable balance between the level of safety provided and the overall cost of improving the highway. In developing these standards, consideration shall be given to the following: right-of-way standards, utility standards, environmental standards, design integrity, constructability, maintenance, traffic volumes, truck volumes, clear zones, the MDSOT Shoulder Paving Policy, traffic speeds, and bicycle & pedestrian usage. The resulting standards are to be used consistently on all highway projects developed with either State or Federal funds that are located off the National Highway System.

This State Standards highway Design Guide is the result of the Task Force findings and deliberations. Information found herein should be used during the planning, design and construction of non-NHS highway projects.

These standards cannot provide for all situations. They are intended to assist, but not to substitute for, competent work by design professionals.

The decision to use a particular road design element at a particular locations should be made on the basis of an engineering analysis of the location. Thus, while this document provides design standards, it is not a substitute for engineering judgment.

Engineers should take into account all available information, including available funding, and use the professional judgment that comes from training and experience to make the final design determination. There should be some record, not necessarily formal or cumbersome, of the matters considered during the design process that justify decisions made regarding the final project design.

It should be understood that these standards are directed at substantive improvements, not at so called “spot improvements” that affect only a small portion of a facility, such as an isolated curve or a minor intersection. Spot improvements on a geometrically substandard facility should be evaluated on an individual basis and be designed to blend in with the remaining adjacent features whenever a more extensive improvement cannot be justified.

The intent of these standards is identical to that of the **AASHTO** policy, which is “...to provide guidance to the designer by referencing a recommended range of values for critical dimensions. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations.”

SECTION B

Design Considerations

The decision to use a particular road design element at a particular location should be made on the basis of an engineering analysis of the location. Thus, while this document provides design standards, it is not a substitute for engineering judgment. The American Association of State Highway Officials *Volume One (1) National Standards* shall be used for any design standards not addressed in this guide.

I. Project Scoping

The factors should be evaluated in the design.

1. System or Functional Classification. The Department has adopted separate tables of geometric design criteria for all projects based on functional classification.
2. Traffic Volumes. The designer should examine the current and projected traffic volumes within the limits of a project on an existing highway. This may influence the decisions on the extent of geometric improvements.
3. Pavement Condition. Projects are often programmed because of a significant deterioration of the existing pavement structure (including sub base, base and surface course). The extent of deterioration will determine the necessary level of pavement improvements. This decision will also influence the extent of practical geometric improvements.
 - a. For pavement overlay projects an evaluation of the roadway should include, at a minimum, field inspection to review existing pavement condition, required upgrades to guardrail, and needed replacement of drainage pipes. Maintenance personnel familiar with the project location should be consulted to determine location of problem areas such as frost heaves and poor drainage.
 - b. For pavement overlay projects, an evaluation of the rutting present in the surface needs to be evaluated as well. If there is significant rutting present (greater than $\frac{3}{4}$ "), a determination should be made whether the rutting is a surface condition, or if there is evidence of base failure. The recommended treatment should be appropriate to address the conditions.
 - c. For highway improvement projects an evaluation as derived above should be completed. In addition the use of the Falling Weight Deflectometer and soils borings are encouraged.
4. Physical Characteristics. The physical constraints within the limits of a project on an existing highway will often determine what geometric improvements are practical and

cost-effective. These include topography, adjacent development, available right-of-way , utilities, and environmental constraints. The designer also should examine the geometric features and design speeds of highway sections adjacent to the proposed project to provide design continuity with the adjacent sections. This involves a consideration of factors such as driver expectations, geometric design consistency and proper transitions between sections of different geometric designs. Other considerations should be the aesthetic, scenic, historic and cultural characteristics.

5. Traffic Controls and Regulations. All signing and pavement markings on all projects must meet the criteria of the Manual on Uniform Traffic Control Devices (MUTCD).
6. Safety Enhancement. All projects on existing highways must be designed to consider and incorporate appropriate, practical safety improvements.
7. Crash Records. The historical crash data within the limits of a proposed project on an existing highway should be evaluated as part of the project development.
8. Potential Impacts of Various Types of Improvements. Projects on existing highways may impact the aesthetic, social, environmental, operational and economic characteristics of the surrounding land and development.
9. Future Development. Project considerations should include future development and access management. (Ref: Access Management Section G).

II. Traffic Volume Controls

1. Design Year Traffic Volumes. The following table has design years beyond the construction completion date for traffic analyses (AADT, design hourly volume, etc.).

| Scope of Work | Design Years |
|--|-------------------------------------|
| New Construction Arterials | 20 years |
| Collector Highway Improvement Program | 12 years |
| PPM Level 2 Rehab | 6 - 8 years 10 Years 12 Years |

Table 1 - Design Year

2. Traffic Data. The designer should obtain from the Bureau of Planning, Research and Community Services the traffic data necessary to determine the scope of improvement.

III. Design Speed

The geometric design features should be consistent with the design speed appropriate for the facility. This may vary from a low of 25 mph in mountainous terrain to a high of 65 mph in flat terrain. It should be noted, however, that the design speed does not necessarily represent the anticipated operating or posted speed.

IV. Vertical Alignment

1. Crest Vertical Curves

The Department's criteria for crest vertical curves is based on providing stopping sight distance (SSD).

If the existing SSD does not meet these criteria, the design should evaluate the practicality of flattening the crest vertical curve. This will be based on the crash history, traffic volumes, construction costs, community concerns, right-of-way, environmental considerations, etc.

For Resurfacing, Rehabilitation, and Restoration (3R) treatment of Arterials and all Collectors the following table shall be used:

| Design Speed (mph) | Minimum Stopping Sight Distance (feet) |
|-----------------------|---|
| 20 | 115 |
| 25 | 155 |
| 30 | 200 |
| 35 | 250 |
| 40 | 305 |
| 45 | 360 |
| 50 | 425 |
| 55 | 495 |
| 60 | 570 |
| 65 | 645 |

Table 2 - Minimum SSD

For reconstruction on Arterials see *Volume One National Standards*.

2. Sag Vertical Curves

The Department has adopted the comfort criteria to evaluate the adequacy of existing sag vertical curves. To determine the adequacy of existing sag vertical curves, follow this procedure:

Calculate the design speed of the existing sag from:

$$L = \frac{AV^2}{46.5}$$

Where: V = design speed, mph

L = existing length of sag vertical curve, meters

A = existing algebraic difference in grades, percent

If an existing sag does not meet the comfort criteria, the designer should evaluate the practicality of flattening the curve. This will be based on accident history, traffic volumes, construction costs, etc.

V. Horizontal Alignment

1. Super elevation Rate/Degree of Curve

If an existing curve in a rural area has a super elevation rate steeper than 6 percent, an $E_{max}=0.08$ may be used. The designer should reference the ***Volume One National Standards*** for combinations of super elevation rate and degree of curve. For additional information see Typical Sections, figures (1-6), and to determine the proper combination of super elevation rate and degree of curve based on project design speed Table 5-6 will be used.

2. Reverse Curves

For reverse curves it will be acceptable to provide no tangent section between the curves unless there is significant crash history. On minor arterials, the use of reverse curves is not preferred.

3. Off Tracking

Designer should take into consideration off tracking when using tighter radius and narrow roadway widths.

When the Degree of Curve = 3° or greater pave shoulder full depth, also consideration should be given to widening pavement in this area.

In the design of Arterials see *Volume One National Standards*.

VI. Cross Section Elements

1. Right-of-Way

Right-of-way acquisition on collectors typically will involve small fee, temporary and permanent easements and grading rights. Occasionally, more extensive right of way involvement may be appropriate if, for example, a horizontal curve is flattened. See section on Right-of-Way.

2. Curbs

The following will apply to the installation or retention of curbs:

- A. Location. Where curb does not exist, the need for curb will be determined on a case-by-case basis.
- B. Type. Where a project will disturb existing curbs, the curb will be replaced in-kind. On new location a case-by-case basis.
- C. Type 3 (bituminous curb) is used for box sections built in rural areas with low to moderate traffic volumes; on the low side of a banked curve in guardrail sections; and to delineate islands, sidewalks and parking areas where the usage is expected to be light duty. In general, mold 1 is used adjacent to sidewalks and mold 2 elsewhere. The minimum radius for Type 3 curb is 5 feet. Cape Cod mold to be considered when maintenance issues such as plowing and driving over the curb is an issue.

1) Maintenance Considerations

- a) Cape Cod Curb
 - b) Design considerations should be given when curb is called for in rural situations, to alternate methods such as add underdrain for subgrade drainage and/or combined with shallow ditch for surface drainage.
- 2) An analysis of the storm water flow in the gutter indicates overtopping the curb for the design parameters (e.g., design-year frequency, ponding on roadway); and/or
 - 3) The curb reveal after construction will be less than 3 inches.

- D. Barrier curb shall not be used for design speeds greater than 45 mph.

3. Sidewalks

Where a project will disturb existing sidewalks, the sidewalk will be replaced in-kind.

Where sidewalks do not currently exist, the need for sidewalks will be determined on a case-by-case basis. Sidewalks must meet ADA regulations. See sidewalk policy.

4. Turning Radii Design

The turning radii design will be determined by the turning characteristics of a WB-67 design vehicle. The criteria for inside clearance are modified as follows. It is desirable that the WB-67 may be allowed to make the right turn such that its wheels will almost touch the pavement edge or curb line. This means that the vehicle will overhang beyond the edge. Therefore, the designer must ensure that the turning vehicle will not impact any obstructions (signal poles, mailboxes, etc.). (Ref: Exhibit 1)

5. Roadside Safety

General Application

The Department should take the opportunity to implement practical roadside safety improvements. The designer should review the roadside crash history to assist in the decision-making. See section on safety.

The design should take into consideration the use of wider shoulders for emergency parking when shoulders of 14 feet or less are used.

Consideration should be given for adding shoulder width at mailbox locations (See Figure B-1).

6. Roadside Clear Zone

Table 3 presents the clear zone distances.

Once a hazard has been identified within the clear zone, the designer should consider the following:

- A. Crash Records. The designer should review the crash data to estimate the extent of the roadside safety problem.
- B. Location Relative to Clear Zone Distance. The closer an obstacle is to the traveled way, the greater the potential benefits of treatment. It is less likely to be cost effective to treat a hazard near the outer edge of the clear zone boundary.
- C. Location Relative to Other Hazards. If a hazard is one of many at about the same distance from the traveled way, this decreases the benefits of treatment. As an example, it may have little benefit to remove an obstacle 12 feet from the travel lane if a line of other obstacles (e.g. trees) are located at 15 feet from the travel lane. However, it may be highly desirable to treat an isolated hazard along the roadside, which is within the clear zone distance.

D. Treatment Costs. A hazard may be removed, relocated or made breakaway. The costs of these treatments will be a factor in the decision-making process.

E. Nature of Hazard. The type of hazard and the available treatments will be a significant factor in the decision-making process. For example, a non-breakaway signpost, which is owned and maintained by the Department, can be made breakaway without any impact on the surrounding environment. However, removing natural features (e.g. trees) may impact the environment and may meet with strong public opposition.

F. Utilities. See section on utilities

G. Safety Appurtenances

All existing safety appurtenances should be examined to determine if they meet the latest safety performance and design criteria. This includes guardrail, impact attenuators, median barriers, sign supports, luminaire supports and bridge rail transitions. All safety appurtenances should be upgraded to meet the most recent design criteria.

The designer should evaluate the roadside environment. The process will be:

- 1) Determine if a barrier is warranted.
- 2) If an existing run of barrier is located where no barrier is warranted, remove the barrier.
- 3) If a barrier is warranted, consider removing or relocating the hazard; reducing its severity (e.g., flattening a slope); or making it breakaway.
- 4) If a hazard cannot be eliminated and a barrier is judged to be cost effective, then install a barrier. The designer should recognize that, depending on the specific site conditions, it may be acceptable to identify a hazard within the applicable clear zone and leave the hazard unshielded. A decision on the cost-effectiveness of barrier installation will be based on construction costs, traffic volumes, crash history, barrier adaptability to the site, etc. versus the hazard created by installing the barrier.
- 5) For any existing runs of guardrail which will remain, ensure that they meet, as practical, the applicable performance and design criteria, including:
 - i) Operational acceptability;
 - ii) Dynamic deflection criteria;
 - iii) Length of need;
 - iv) Lateral placement;
 - v) Placement on slopes and behind curbs; and
 - vi) End treatments.
 - a) Length of Need

Determine Length of Need (L). Use the following equation:

$$L = \frac{LH - LB}{\tan 10^\circ} \qquad L = \frac{LH - LB}{\tan 15^\circ} \qquad \tan 10^\circ = 0.176327 \qquad \tan 15^\circ = .267807$$

End Treatment. A crashworthy terminal should be used beyond this point. Reference should be made to the new Guardrail and Guardrail Terminal Policy located in Section G Policies. If other approved terminal ends are used, the distance beyond L may need to be adjusted to satisfy the barrier needs of the selected system. For a one-way roadway, an unanchored end is acceptable at the trailing end. The end will be located a minimum of 50' beyond an obstacle and 66' beyond a steep embankment.

Opposing Traffic. For opposing traffic on a two-way roadway, a length of need calculation for the trailing end is necessary if the break in the embankment slope or any part of the obstacle is within the clear zone as measured from the centerline of the roadway. See Step 8. The trailing end of the barrier will be 50', beyond the end of the roadway hazard, including end treatments.

Opposing Traffic Length of Need. Where needed, the length of need calculation for opposing traffic is determined using the same procedure as for approaching traffic, except that all distances will be measured from the centerline of the roadway. The minimum distance to the end of the barrier, excluding end treatment, will be 50' beyond the end of an obstacle and 66' beyond the end of a steep embankment.

Table 3 - Geometric Design Criteria

Minor Collectors

| Design Year AADT | Roadway Width | Roadway (ft) Configuration | Side Slope | Design Speed | Clear Zone | Safety Considerations |
|---------------------|------------------|--------------------------------------|---------------|--------------|------------|---|
| Under 1000 | 24 ft. | 12 ft. - 12 ft. | 3:1 | 40 mph | 8 ft. | Where practical increase road width to 26 ft. with stripe at 10 ft. and clear Zone to 10 ft. |
| 1000 - 4000 | 28 ft. | 14 ft. - 14 ft. Stripe at: 11 ft. | 3:1 | 40 mph | 9 ft. | Travel lane width of 20 ft. may be acceptable up to 3000 AADT. Where practical increase clear zone to 10 ft. |
| Over 4000 | See | Major Collector | 3:1 | 45 mph | 10 ft. | No Safety Comments |

Major Collectors

| | | | | | | |
|-------------|--------|--------------------------------------|-----|--------|--------|---|
| Under 1000 | 24 ft. | 12 ft. - 12 ft. | 3:1 | 45 mph | 10 ft. | Where practical increase roadway width to 26 ft. with strip at 10 ft. |
| 1000 - 4000 | 28 ft. | 14 ft. - 14 ft. Stripe at: 11 ft. | 3:1 | 45 mph | 10 ft. | Travel lane width of 20 ft. May be acceptable up to 3000 AADT |
| 4000 - 6000 | 30 ft. | 15 ft. - 15 ft. Stripe at: 11 ft. | 3:1 | 45 mph | 10 ft. | No Safety Comments |
| Over 6000 | 36 ft. | 6-24-6 ft. | 3:1 | 45 mph | 15 ft. | No Safety Comments |

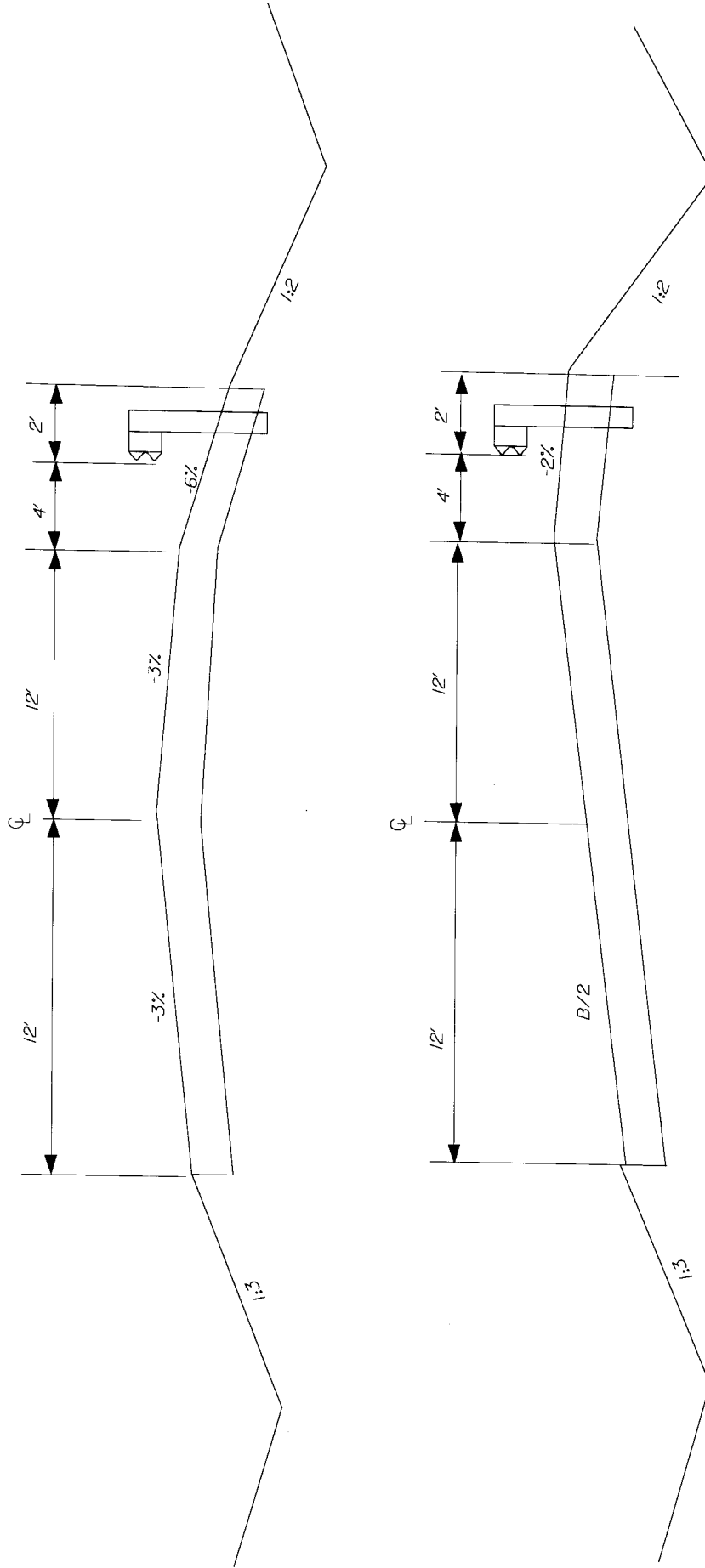
Table 3 - Geometric Design Criteria (continued)

Minor Arterials

| Design Year AADT | Roadway Width | Roadway (ft.) Configuration | Side Slope | Design Speed | Clear Zone | Safety Considerations |
|---------------------|---------------|--------------------------------|------------|--------------|------------|---|
| Under 1000 | 28 ft. | 14 - 14 | 3:1 | 45 mph | 10 ft. | Travel lane width of 20 ft. May be acceptable |
| 1000 - 6000 | See | Major | Collector | | | Travel lane width of 20 ft. =May be acceptable up to 3000 AADT |
| 6000 - 8000 | 36 ft. | (6 - 24 - 6) | 1:4 | 55 mph | 20 ft. | Travel lane width of 22 ft. May be acceptable |
| Over 8000 | 40 ft. | (8 - 24 - 8) | 1:4 | 55 mph | 20 ft. | No Safety Comments |

TYPICAL ROAD WIDTHS

MINOR COLLECTOR (AADT LESS THAN 1000)



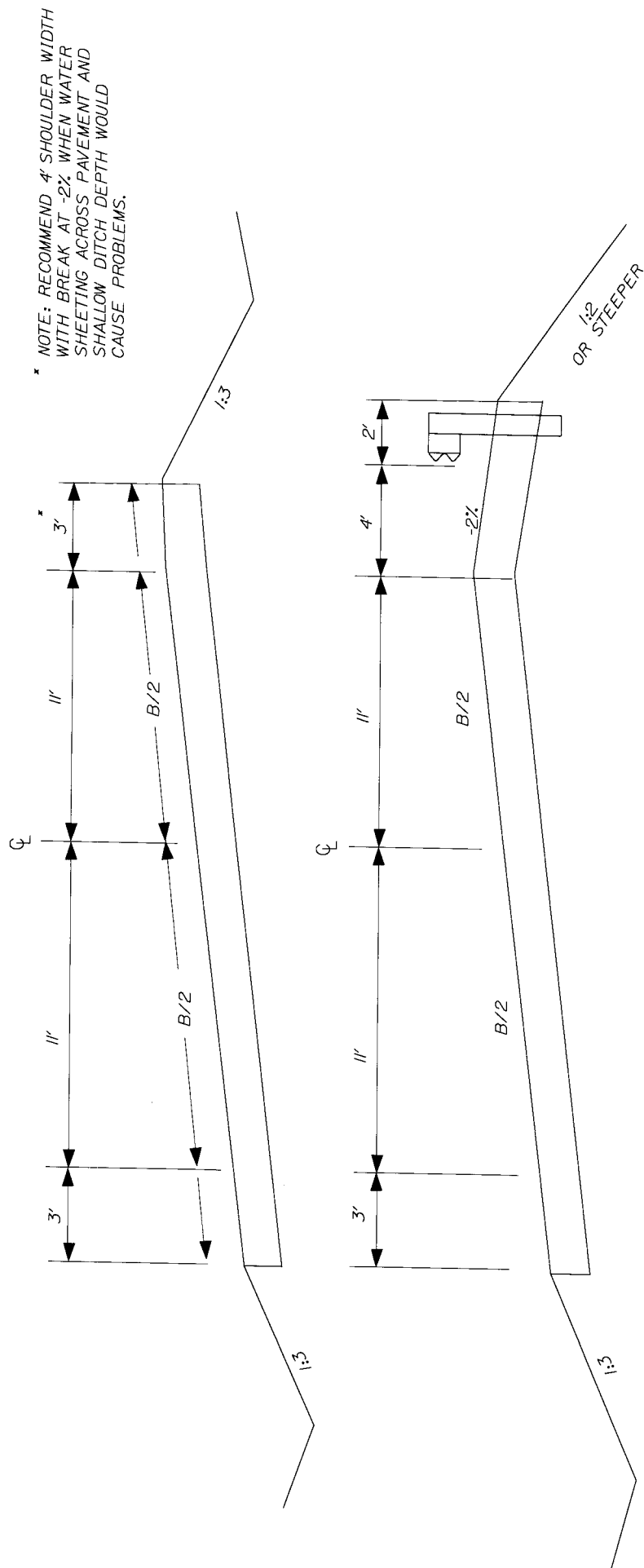
NOT TO SCALE

NOTE: WHEN GUARDRAIL IS PRESENT ON BOTH SIDES OF THE ROAD, THE RECOMMENDED OFFSET TO FACE OF RAIL IS 16 FEET.

FIGURE 1

TYPICAL ROAD WIDTHS

MINOR COLLECTOR (AADT 1000 - 4000)



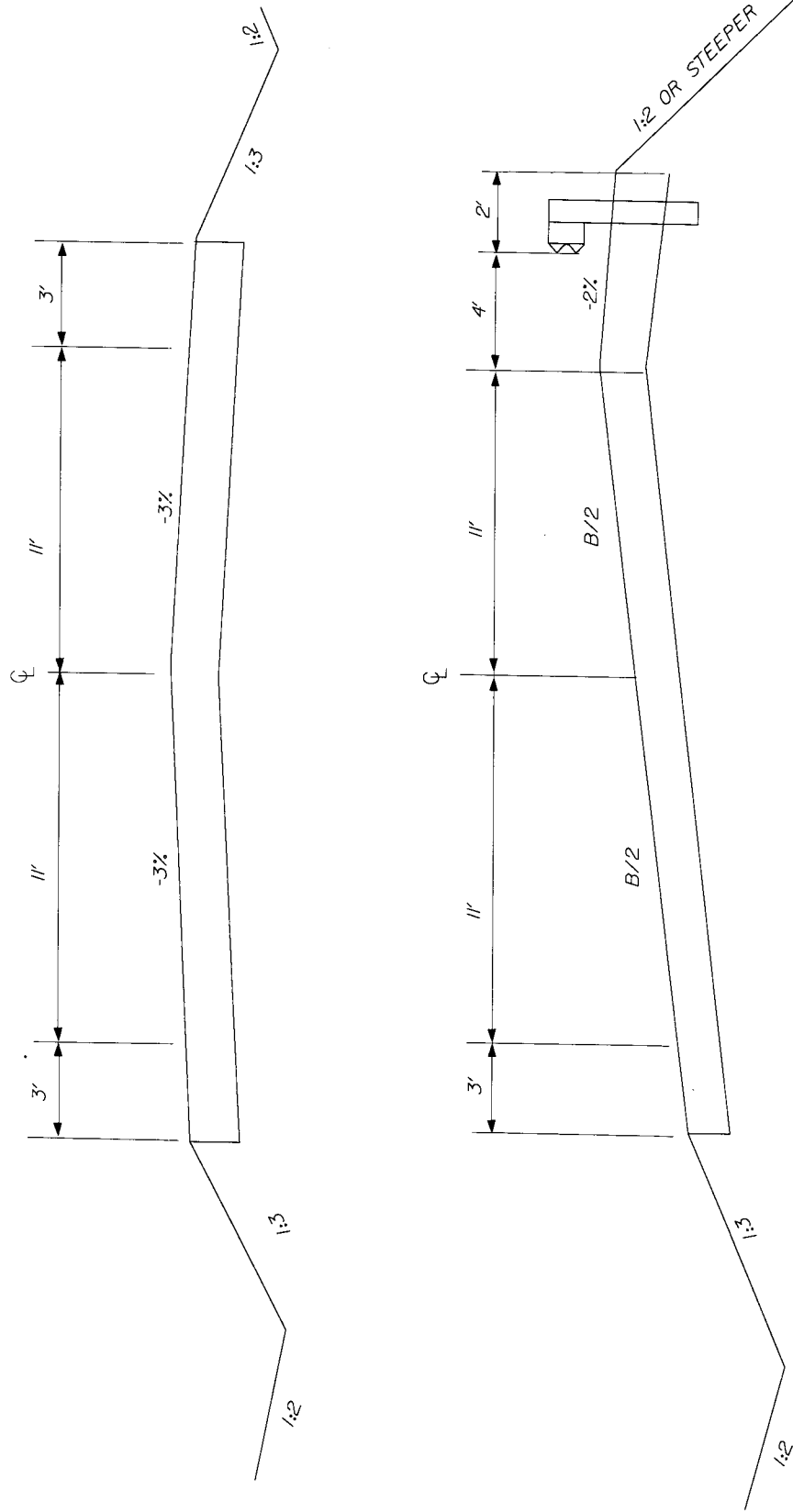
NOT TO SCALE

NOTE: WHEN GUARDRAIL IS PRESENT ON BOTH SIDES OF THE ROAD, THE RECOMMENDED OFFSET TO FACE OF RAIL IS 16 FEET.

FIGURE 2

TYPICAL ROAD WIDTHS

MAJOR COLLECTOR (AADT 1000-4000)



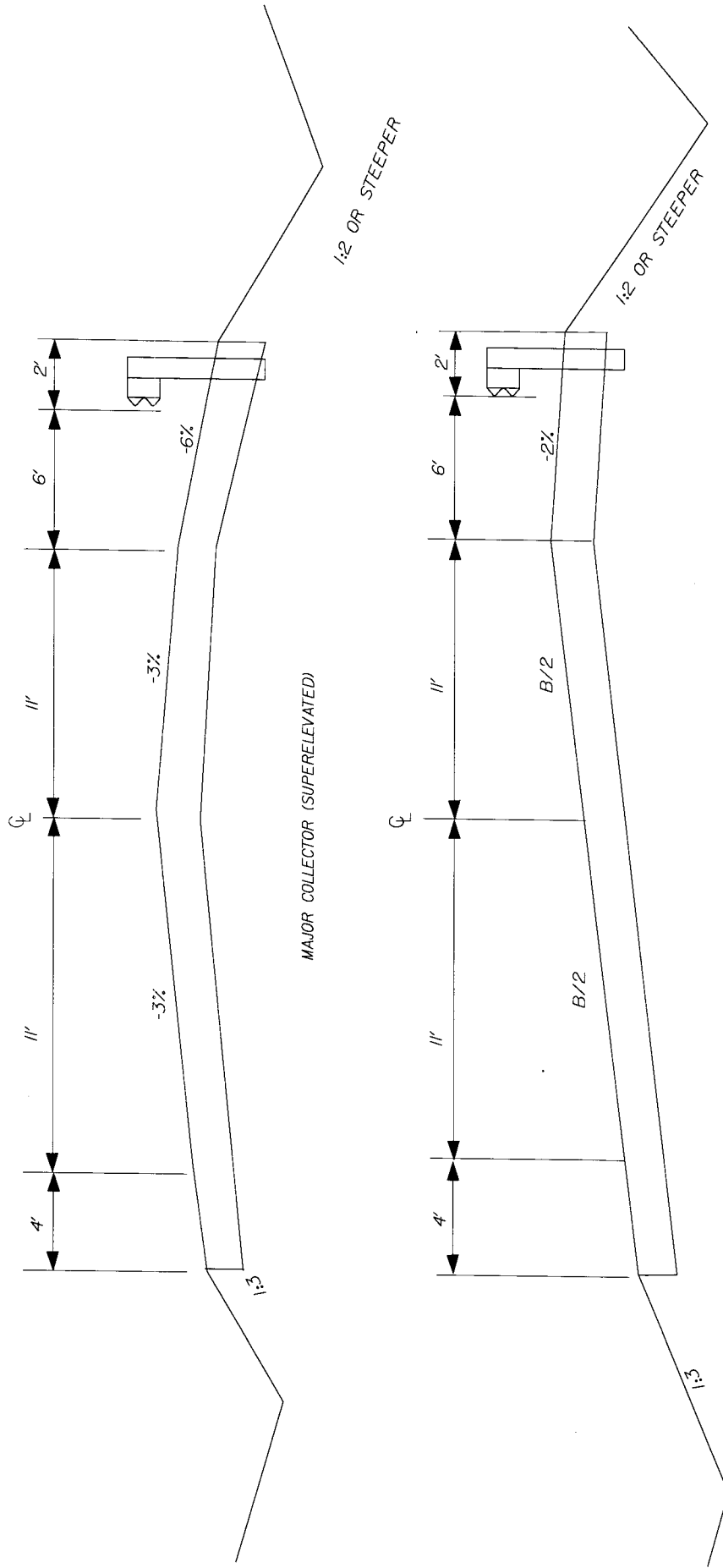
NOT TO SCALE

NOTE: WHEN GUARDRAIL IS PRESENT ON BOTH SIDES OF THE ROAD, THE RECOMMENDED OFFSET TO FACE OF RAIL IS 16 FEET.

FIGURE 3

TYPICAL ROAD WIDTHS

MAJOR COLLECTOR (AADT 4000 - 6000)



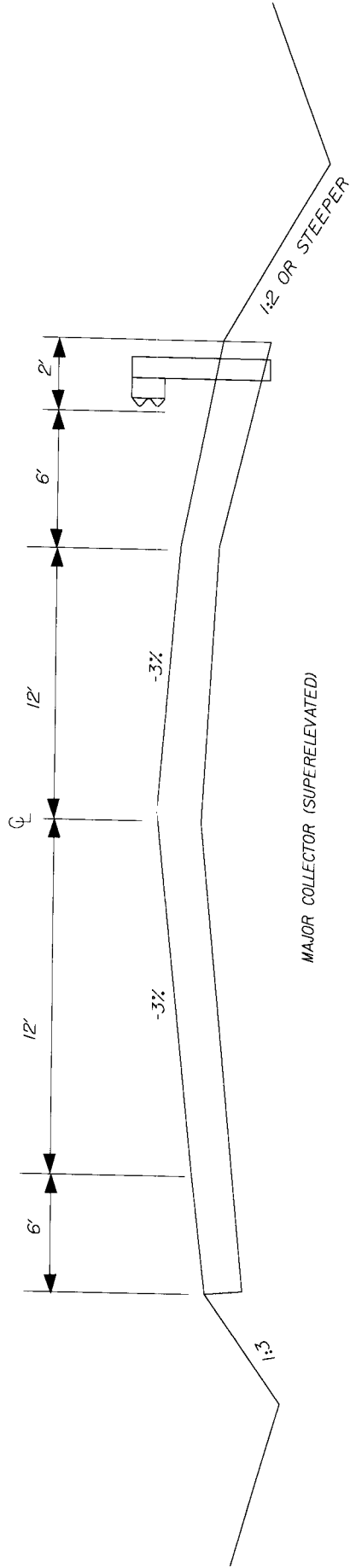
MAJOR COLLECTOR (SUPERELEVATED)

NOT TO SCALE

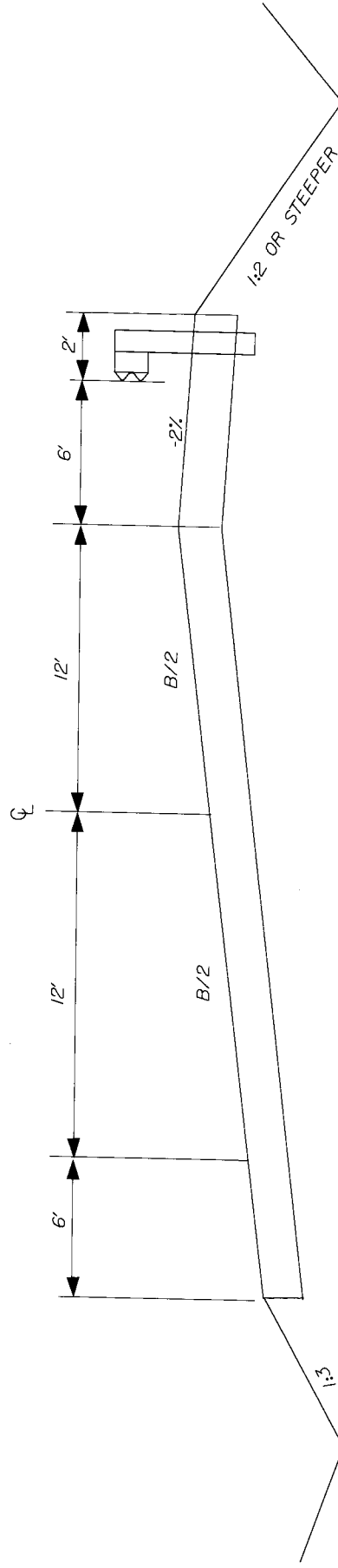
FIGURE 4a

TYPICAL ROAD WIDTHS

MAJOR COLLECTOR (AADT OVER 6000)



MAJOR COLLECTOR (SUPERELEVATED)

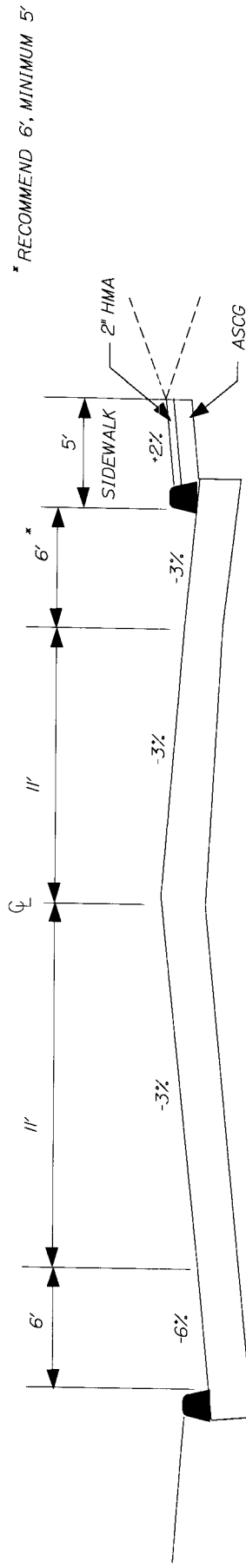


NOT TO SCALE

FIGURE 4b

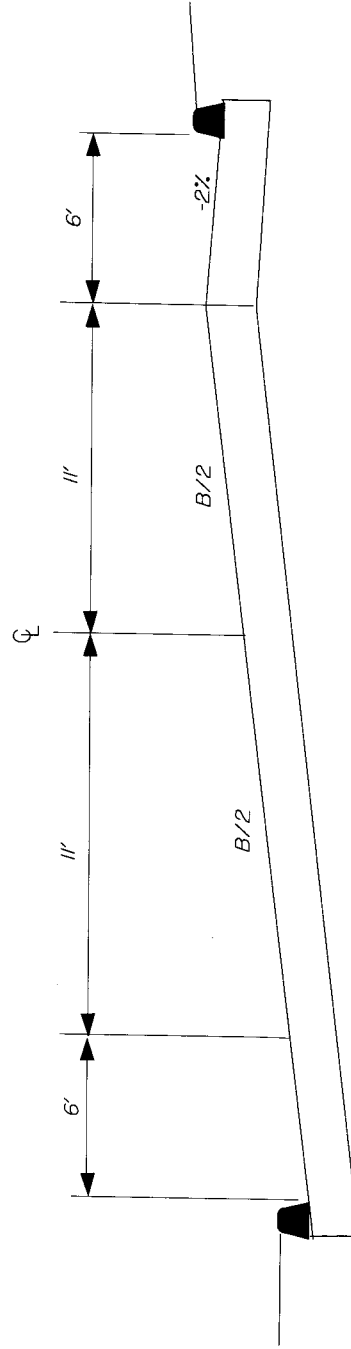
TYPICAL ROAD WIDTHS

COLLECTOR CURBED SECTIONS BOTH URBAN AND RURAL



* RECOMMEND 6', MINIMUM 5'

COLLECTOR SUPERELEVATION

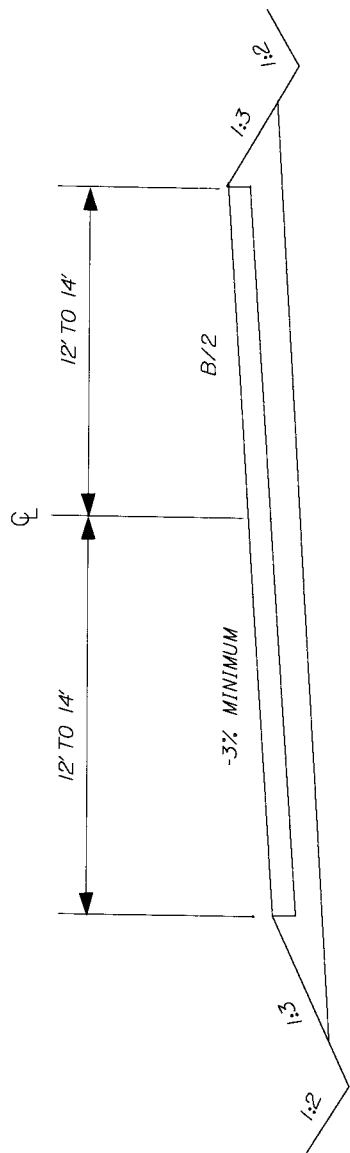


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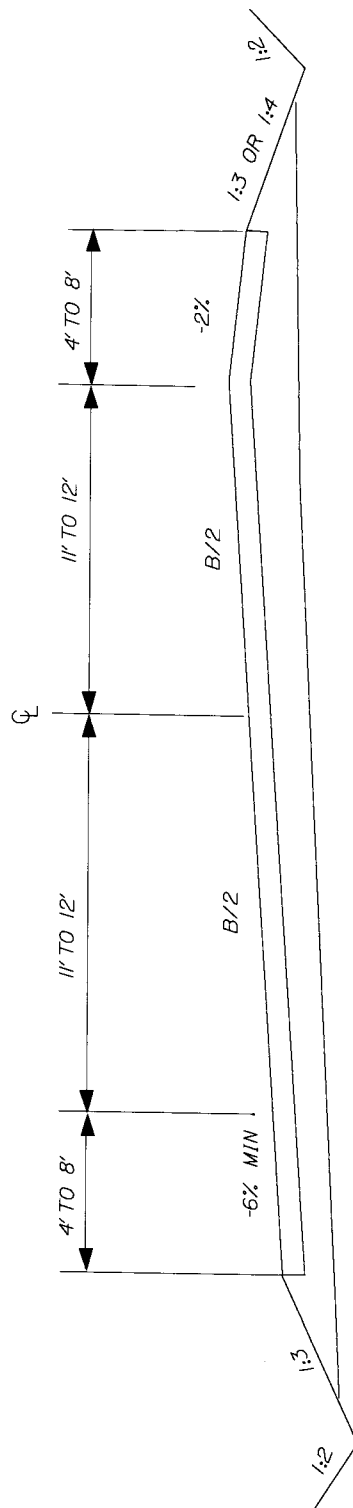
FIGURE 5

SUPERELEVATIONS

MINOR / MAJOR COLLECTORS



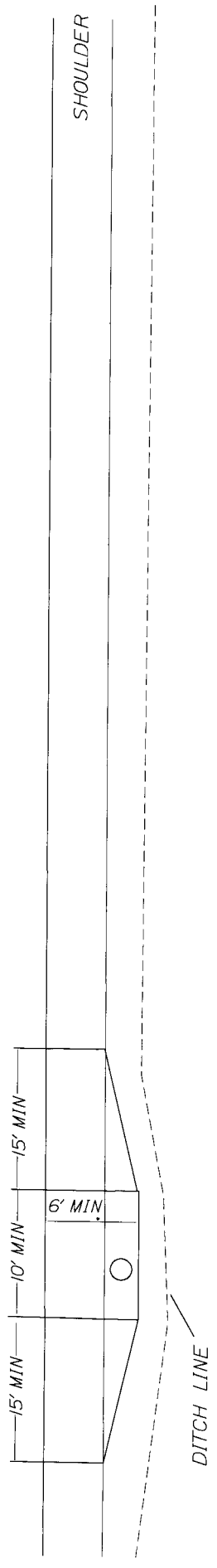
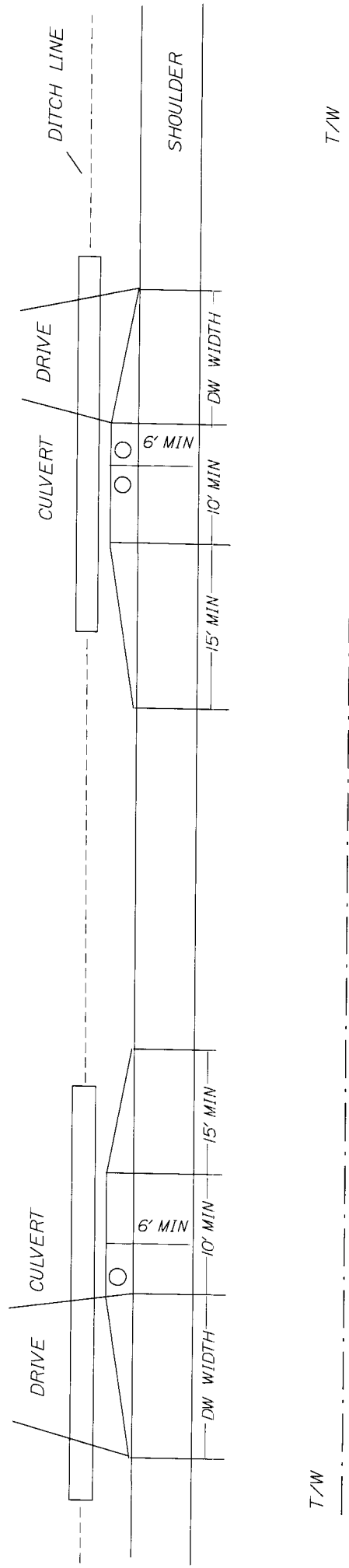
MINOR ARTERIAL



NOT TO SCALE

NOTE: 1:4 IF AADT IS OVER 6000

FIGURE 6



MAILBOX WIDENING AREAS
(For Shoulders Less Than 6' Wide)

NOT TO SCALE

FIGURE B-7

FOR OPPOSITE SIDE OF ROAD LH IS FROM ϕ

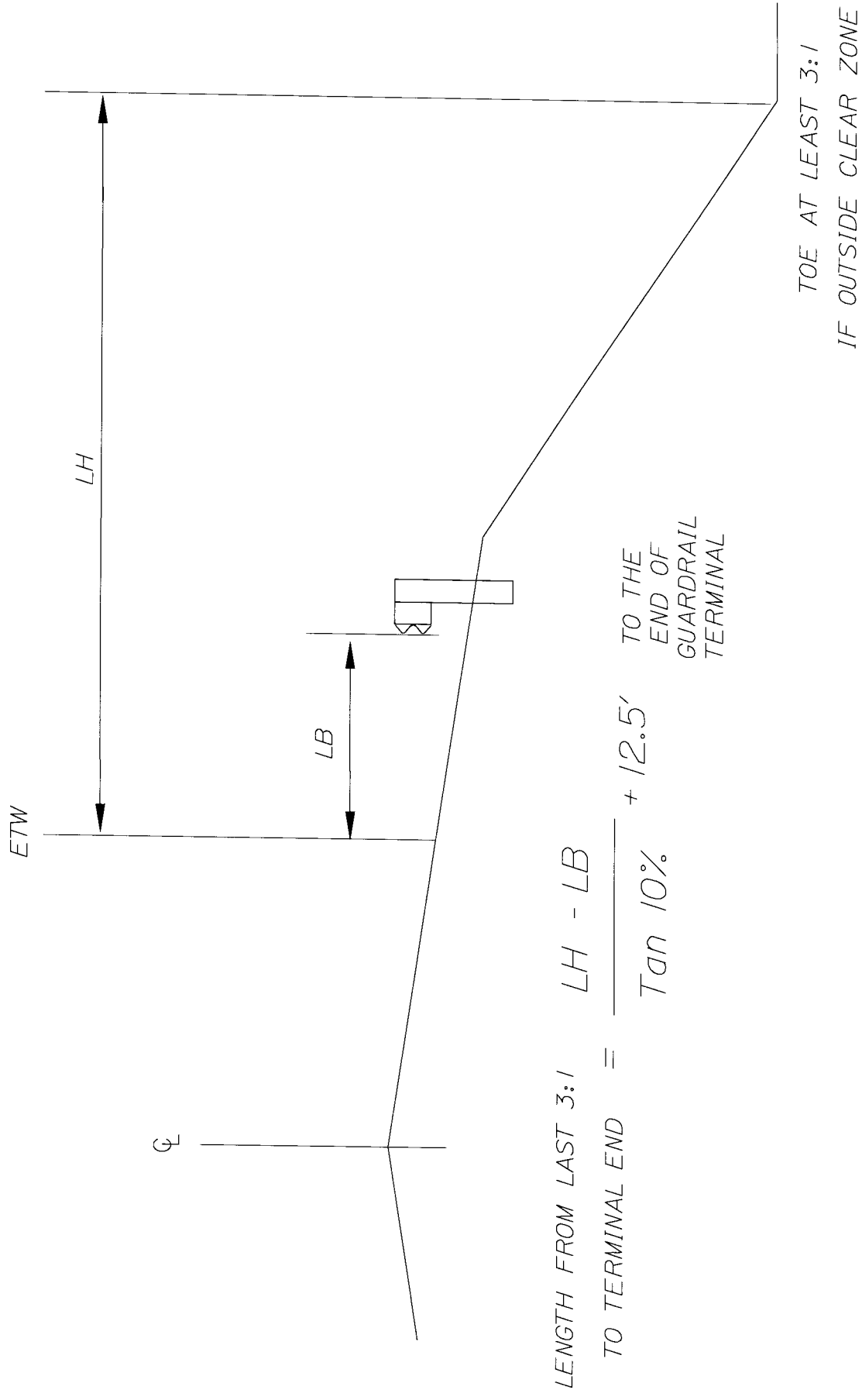
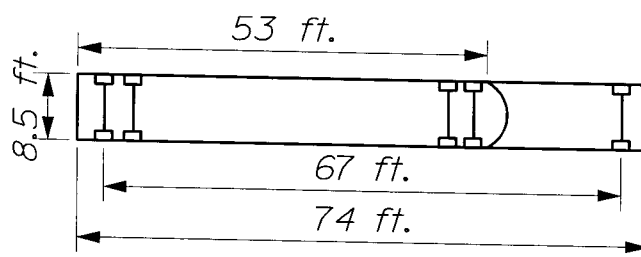
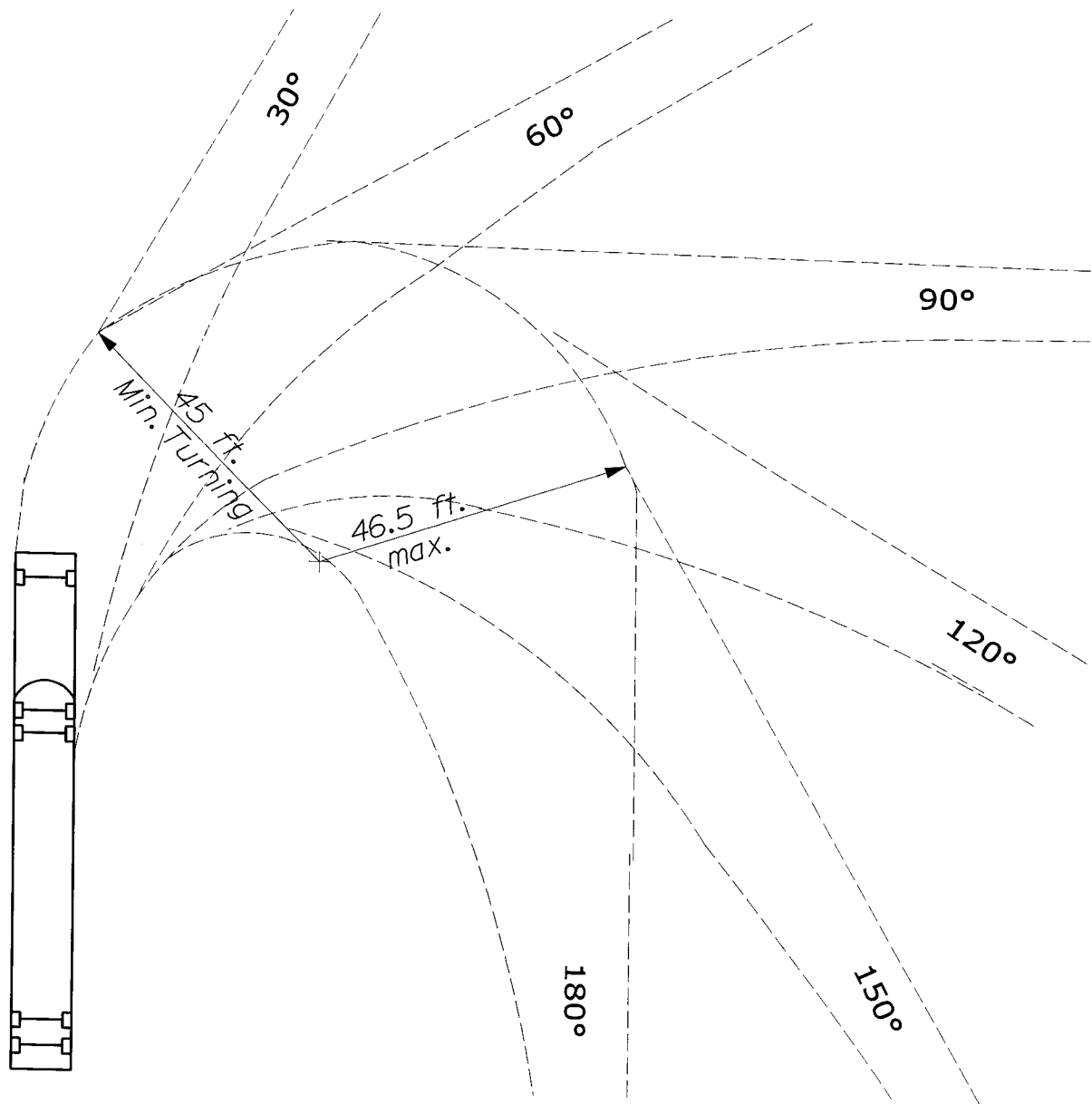
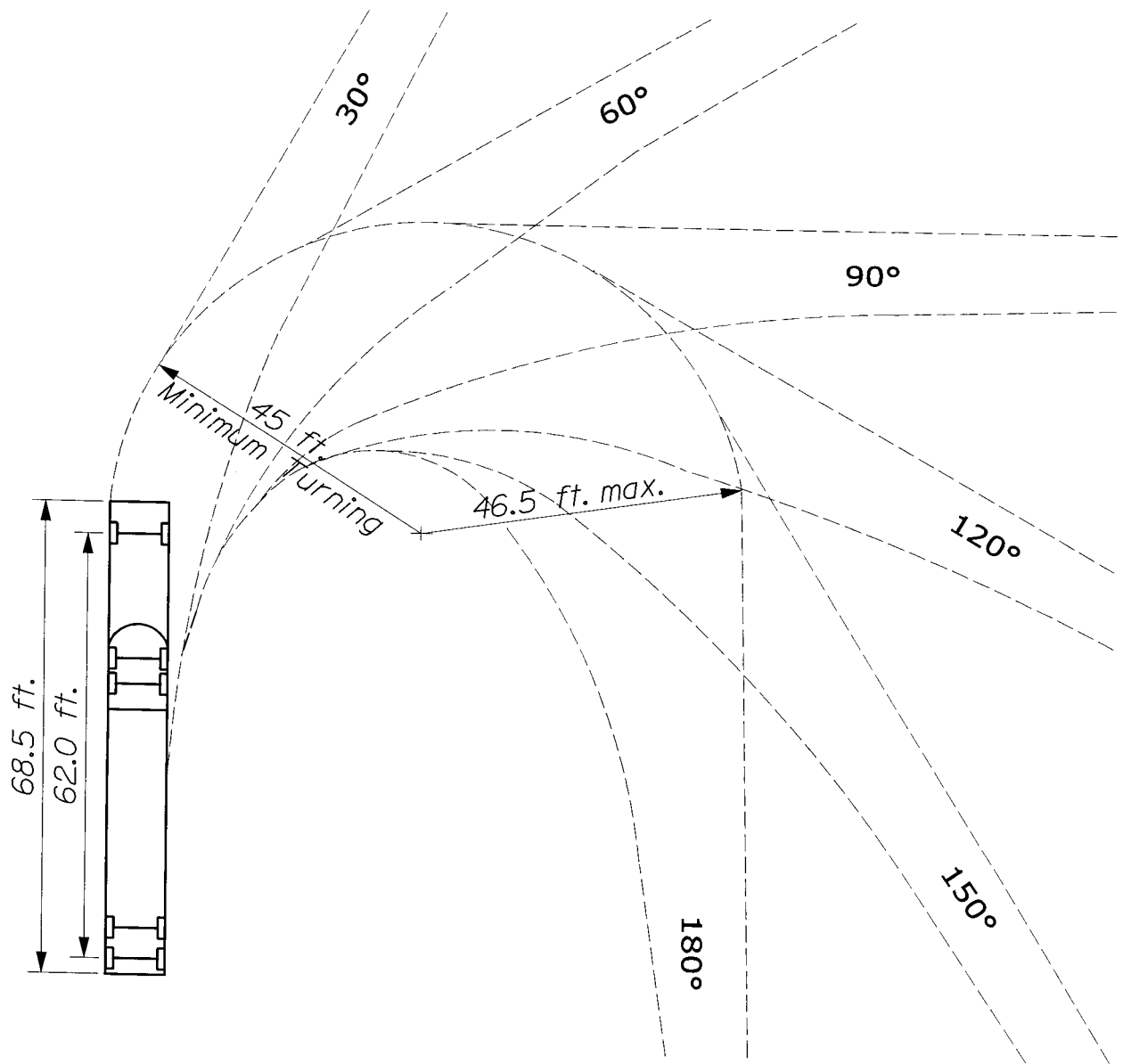


FIGURE -8

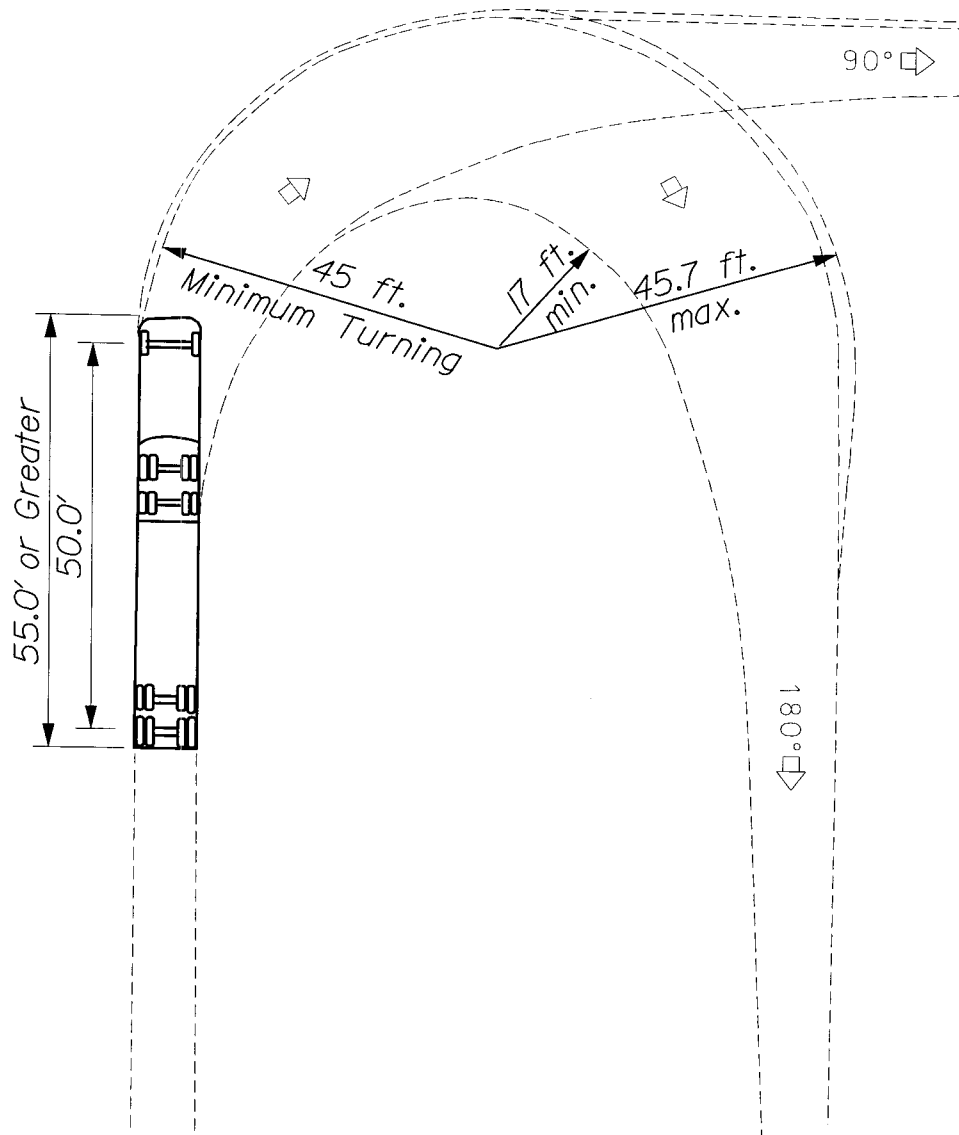


MINIMUM TURNING PATH FOR
INTERSTATE SEMITRAILER (WB-65 & WB-67)



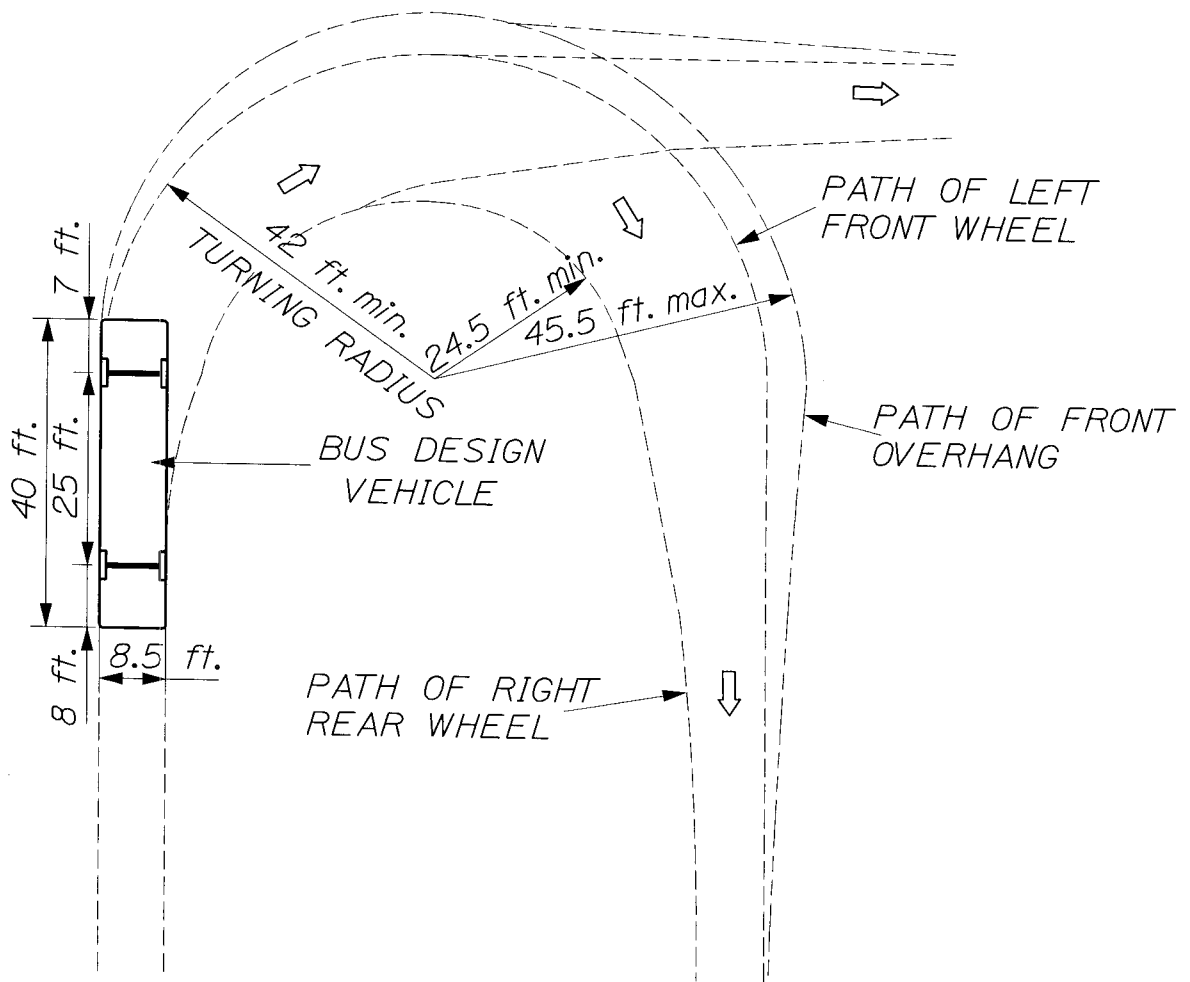
MINIMUM TURNING PATH FOR
INTERSTATE SEMITRAILER (WB-62)

Exhibit 2

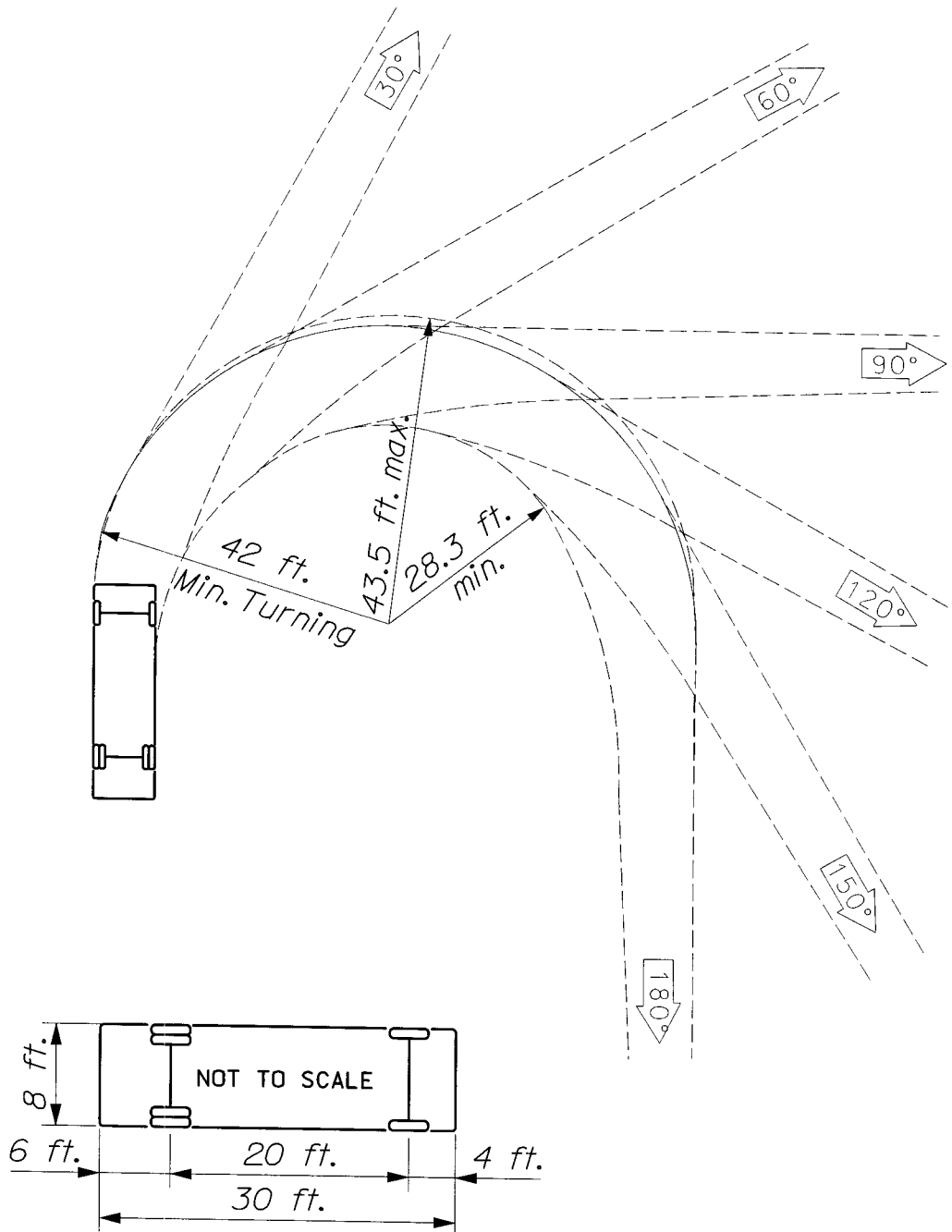


MINIMUM TURNING PATH FOR
INTERMEDIATE SEMITRAILER (WB-50)

Exhibit 3



MINIMUM TURNING PATH FOR
CITY TRANSIT BUS DESIGN VEHICLE



MINIMUM TURNING PATH FOR
SU (SINGLE UNIT) TRUCK DESIGN VEHICLE

Exhibit 5

SECTION C

Safety

1. General Considerations

Cross-section uniformity is one of the most significant factors affecting highway safety. Consistent roadway lane and shoulder width, side slope and clear zone provide drivers a predictable surface to navigate on. Most drivers adjust their speed and attention to the general road situation. There are elements, however, that can potentially disrupt safe driving capabilities. Sharp curves, other abrupt changes in alignment, frequent speed limit changes, and vehicle conflicts caused by frequent driveway entrances all contribute to surprise the unsuspecting driver, and often result in vehicle collisions. These additional adverse driving factors must be minimized in road design.

Project-specific historical crash data should always be reviewed to determine what types of safety improvements can be implemented. Particular attention should be given to the overall critical rate factor and percent of injuries, as well as locations experiencing frequent crashes. Crash data and analysis assistance can be obtained from the Crash Records Section, Traffic Engineering Division of the Bureau of Maintenance and Operations or the Safety Management Section of the Systems Management and Division within the Bureau of Planning.

Crash data for various road classifications, width configurations, AADT's and speeds were reviewed to evaluate crash rate performance. Safety recommendations from this analysis are shown in Table 4. Modifying cross section width from the recommended state standards may be required at times due to environmental, public opinion, or other considerations. The following are situations, where from a safety standpoint, changes may be considered.

- For AADT values less than 1,000, the minimum safety recommendation exceeds the proposed design standards for Minor Collectors and Major Collectors. Wherever possible, the proposed design standard for shoulder width should be increased to reduce crash potential, in accordance with Table 3.
- Conversely, the design standard may be reduced, at least from a safety standpoint, for travel lane and shoulder widths for AADT values ranging from 1,000 to 3,000 for Minor and Major Collectors, and up to 4,000 AADT for Minor Arterial Roads.
- The minimum standards should be increased wherever a larger than Normal proportion of the Design AADT will be comprised of heavy truck volumes, particularly at the lower design volumes, in order to allow for the larger width vehicles. Consideration must be provided for turning radii at intersections and off tracking.

11. Shoulder Surface

Gravel shoulders out-perform paved shoulders when AADT is less than 1,000; but at all other AADT levels, paved shoulders are preferable. Two other shoulder surface selection criteria to consider are that gravel shoulders are more expensive to maintain and that paved shoulders provide a better bike use surface. These combined considerations indicate that, in most cases, paved shoulders are preferable. (Ref: Shoulder Policy, Section G).

111. Lane Edge Line Striping

It is important to note that all travel lane edges should be striped in accordance with the Roadway Configurations provided in Table 3. The lack of a visible edge line is one of the most common user complaints. Also, Run Off Road crashes account for 23% of all crashes and over 39% of all fatal crashes. Proper roadside delineation is considered one of the lowest cost methods to help reduce Run Off Road Crashes. It may be advisable to taper the edge line stripe at intersections to encourage motorists to shift to the right to turn and to discourage trucks and other vehicles from parking on the shoulder for quick entry to convenient stores, or similar stops.

1V. Access Management

The number, location and size of driveway entrances impact the safety and maximum allowable speeds of highways. It is advisable to work with individual property owners to reduce the number and size of highway openings to their property. Whenever possible, avoid allowing entrances at or very near intersections. For corner properties, it may be possible to allow one entrance on each leg of the intersection rather than multiple entrances on either or both legs to allow exiting traffic to take advantage of the intersection controls and thereby increase their safety.

A new law regarding access management on rural arterials was passed by the State Legislature in 2000. Rulemaking occurred in 2001, and an Access Management Policy has been developed and added to these Design Guidelines. Refer to the Access Management & Guideline in the Policy Section (Section G).

V. Additional Considerations for Intersections

Special considerations should be made at intersections to ensure smooth traffic flow at reasonable speeds. For instance, in locations where traffic volumes and conditions fall short of the warrants for a bypass lane, it may be desirable to improve traffic flow at intersections by transitioning into a wider travel width to allow vehicles to continue past left-turning traffic. Avoid installing “slip ramps” and other driver

encouragements to enter intersections at high speeds. Many drivers frequently fail to yield the right of way, or stop suddenly and cause a rear-end crash. Also, elderly drivers lack the mobility needed to turn their heads to view traffic conditions prior to merging.

Consider roundabouts at appropriate intersections, to allow traffic to continue moving at slow speeds. Traffic signals increase delay and frequently result in increased rear-end collisions.

Avoid large expanses of pavement at intersections. The addition of traffic islands helps delineate proper vehicle paths and can provide pedestrian refuge. Lane demarcation signs should be installed overhead whenever possible. This practice allows drivers to determine sooner which lane they should be in, and reduces future maintenance costs resulting from pavement paint markings.

SECTION D

Utilities

Depending upon the scope of work, both aboveground and underground utilities may be affected through either conflicts with the highway construction or the need to meet current safety standards. This section outlines the coordination process and the above ground standards that apply to all non-NHS projects.

I. Coordination

All utilities located within the limits of a highway project require notification of the proposed work at the earliest stage possible to allow them to adequately plan, fund, and coordinate their work. Although general utility coordination must occur in conjunction with our planning process, the steps applicable to the development of a specific project include the following:

1. The initial “data gathering” and survey stage of a project includes: an early notice to utilities of the proposed improvements; a request that the utilities identify the location of any facilities and/or plans for any improvements within the next five years; and any expected claims by utilities for MDOT reimbursement for relocation (typically, where utilities own their easement).
2. Coordination with utilities must be maintained throughout the design process to keep the utilities apprised of potential conflicts and to determine subsequent relocations. The design of all projects should minimize costs not only to the project, but to the utilities as well. Reduced utility relocations not only result in a savings to the utility rate payers (which are the same customers MDOT serves), but also to the project through a reduction in the amount of time which would otherwise be required to achieve extensive relocations.
3. Each project must make sufficient design information available to the utilities early enough to permit them to identify impacts and relocation requirements; and to plan, fund, and coordinate their work in a timely manner. Final design information must be submitted to all utilities on the project with sufficient time to allow the utilities’ final design of any utility relocations, procurement of materials, and scheduling of the necessary field crews.
4. Determination of right-of-way requirements on a project must include consideration of the accommodation needs of the utilities.
5. Throughout the construction phase, coordination with the utilities must be maintained to keep the project on schedule and to address any unforeseen issues. MDOT and a utility may agree to include utility work in an MDOT construction contract; for further information including procedures and sample agreement forms contact the Utilities Section in Augusta.

II. Offsets

Aboveground utilities within the limits of projects constructed to these State Standards

shall comply with the clear zone offsets specified in Table 3. Although these clear zone values replace all previous standards relating to above ground offsets on non-NHS projects, all other applicable utility accommodation standards shall remain in effect (Reference MDOT UTILITY ACCOMMODATION POLICY 17-229 CMR CHAPTER 210).

The clear zone offsets specified in Table 3 are distances measured from the edge of travel way (white edge line). Where the edge of travel way is difficult to determine, it may be assumed at 10 feet, 11 feet, or 12 feet as indicated by the highway classification and AADT in Table 3. In no case shall these offsets result in an above ground utility location closer than 6 feet from the outside edge of shoulder. It is also important to recognize that the clear zone offsets indicated are minimum values (barring the exceptions described below). Whenever possible, greater offsets are encouraged to increase highway safety and decrease the potential for future conflicts.

Exceptions to the minimum clear zone offsets may be made in the following cases:

- **Curb Sections:** In areas with posted speeds of 35 mph or less, poles may be placed a minimum of 1 foot behind the face of curb.
- **“2 Feet”:** If an existing pole is within 2 feet of the required minimum pole offset and meets all of the following criteria, it may remain in place:
 1. The existing facility does not conflict with the highway construction or any of the permanent highway features;
 2. The existing facility does not conflict with any other standard defined in the MDOT UTILITY ACCOMMODATION POLICY 17-229 CMP CHAPTER 210.
- **Restricted Right-of-Way on Collector Roads:** If sufficient right-of-way is not available on a collector road to attain the minimum clear zone offset requirements and the segment of road in concern has not experienced 3 or more utility pole crashes in the past 3 years, the Department may elect to permit the above ground utilities to locate as close as practicable to the existing right-of-way limits.

Right-of-way

In most cases, MDOT projects require access to property not owned by the Department. Sometimes an easement may be the best solution, either temporary or permanent. At other times strips of land may be needed or, in a few instances, an entire parcel. Whatever the area or particular right needed, the following standards provide a basic guide to the process of acquisition. These standards are based on the fact that we have no right to trespass on the land of another and; if property is needed, we must offer fair compensation to the property owner. These standards should be considered in conjunction with, not in replacement of, the MDOT Right-of-way Manual, Federal laws and regulations, State laws and regulations, and the Federal Aid Policy Guide.

More detailed information and source references are available in the matrix attached as Table A to this section.

I. Identification of Existing and New right-of-way

1. Identification of what is owned and what is needed, with consideration given to utility relocation requirements. As early as possible in the project process, a plan or sketch will be developed with sufficient detail to identify road boundaries in relation to the anticipated work.
2. Examine existing Right-of-Way records, or the scope of public use and maintenance for more than twenty years (prescriptive easement), to determine any acquisitions necessary to accommodate construction, operation, and maintenance of the roadway. What is needed will depend upon what type of work is going to be done. Typical width of the required right-of-way is shown on the accompanying Table B.
3. Develop property owner reports (POR) for potentially affected properties. This report (POR) details specific property information necessary for the design of the project and valuation of the property to be acquired. The POR is available as Form R/W 46 and should be completed in its entirety.
4. Provide Legal Division with the project scope of work, plan or sketch, and PORs so that title work can be initiated.
5. For any condemnation proceeding, a plan showing the affected area must be prepared for recording at the appropriate Registry of Deeds. For acquisition of permanent rights without condemnation, the description must contain sufficient detail so that any interested party may easily ascertain and locate the property acquired.

II. Valuation and Compensation

1. Determine compensation for the property rights to be acquired. Prior to any negotiations with property owners, the fair market value must be established by a qualified person as determined by MDOT in Augusta. The determination of fair market value may be through the Administrative Acquisition Process where eligible, or through the initiation of appraisals where necessary. In either case, a review of the valuation by a qualified person is required.
2. If Federal funds are involved, the NEPA review must be complete prior to any offer to acquire property rights.
3. Property owner is promptly offered, in writing, compensation for the rights to be acquired. The property owner is notified of his/her right to compensation and right to appeal any condemnation award through the State Claims Commission. The property owner may choose to donate the rights or to accept less than the amount offered, but only after being offered the fair market value. No one may take any action or make any statement that may coerce a property owner into agreeing to a price for the property. In some cases the fair market value will be less than the MDOT minimum compensation

policy, in which case the minimum award shall be offered (\$250 for any permanent right and \$100 for any temporary right).

III. Relocation

Determine necessity for relocation. A minimum of ninety days written notice is required from notification of relocation until the property must be vacated. This applies to any occupation of the property to be acquired including businesses, farms, non-profit agencies, and residential uses (both owner-occupied and lessee), and personal property such as signs. A written 90-day notice to vacate cannot be provided a residential displacee until at least one and preferably three comparable replacement dwellings are presented that are decent, safe and sanitary, functionally equivalent, and within residents' financial means. Relocations entail special benefits and allowances to the displaced persons and all relocation efforts must be coordinated with the Relocation Manager to insure compliance.

IV. Acquisition

1. If the offer is accepted by the property owner, acquisition proceeds by friendly condemnation or document, the Program Services Unit is notified for administrative processing. Final plans and documents are prepared for recording at the appropriate Registry of Deeds. Checks in the agreed amount are prepared.
2. If the offer is not accepted by the property owner, appraisals are prepared as necessary and the Program Services Unit is notified to prepare condemnation. Final plans are prepared for recording. Checks are prepared for the amount determined to be just compensation.
3. MDOT acquires the ownership once condemnation is complete, but possession can take place only after the property owner has been paid except in the case of work permits.
4. On certain occasions, work permits may be used so that construction may begin while the acquisition is in process. For projects, which are federally funded, a work permit can only be used in exceptional circumstances as approved by FHWA and the Program Manager upon recommendation of the real estate manager. Where the project is fully state funded, work permits may be authorized by the real estate manager as long as the full acquisition process is completed in a timely manner. In any instance; early entry must be expressly agreed to by the property owner after full disclosure of the work to be done, rights to be acquired, and right to compensation. The remainder of the acquisition process including payment of the compensation due must be completed in a timely manner.

V. Certification

Once all rights have been acquired, the Right-of-Way Certificate is prepared and signed by the Program Manager upon recommendation of the Real Estate Manager. The certificate typically states that all needed right-of-way has been acquired and all relocations are complete. Completion of the certification precedes advertising the project, or starting work on the project if it is to be done with agency personnel. Where work permits are used, the certification should identify the parcels for which the permits are in place and the schedule for completion of the right-of-way acquisition process.

VI. Record Keeping Requirements

The administrative offices and all individuals responsible for performing right-of-way functions must keep adequate records and files documenting actions taken and supporting the certification. This includes original copies of work permits, easements, PORs, correspondence, and copies of plans. Program Services Section in Augusta will maintain all official records related to right-of-way activities throughout MDOT. The real estate manager will be responsible for the appropriate coordination between project managers and the Program Services Section for the timely delivery of documents and files.

VI. Waiver of Regulations

The FHWA may waive requirements of the Uniform Act if it determines that the waiver does not reduce any assistance or protection provided to the owner or displaced person. Waivers are determined on a case-by-case basis. Where a waiver is contemplated, early coordination must be made with the Real Estate manager in the appropriate program. The Real Estate manager will coordinate the waiver with FHWA and the Program Services Section in Augusta where necessary.

**Table A - Right-of-Way Process Guide
July 2003**

| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|---------------|--|--|--|---|
| 1 | Survey, plan, and description of property rights to be acquired (R35) | R/W Mapping or Division Offices | All acquisitions, except survey made by omitted if adequate description already exists | 23 MRSA 153-B; 23 MRSA 154 23 CFR 710.203(1)(3) R/W Manuel 2-6 |
| 2 | Public hearing to explain and discuss land acquisition process | Any qualified representative | Before negotiations begin, preferably at “blank sheet” public meeting before design and appraisal | Step 8 MDOT Project Development Process, NEPA R/W Manuel 1-4.02 |
| 3 | Determination of public exigency [that the acquisition is a necessity] (R35) | R/W Mapping or Divisions by setting proposed R/W limits; Commissioner, by signing the condemnation order | Whenever property is taken for public use | Art. 1, Section 21, Maine Constitution R/W Manual 2-109; Table 2-4; 5-1.02 |
| 4 | Formal appraisal before negotiations start (R65) | Appraiser | When property is taken, except when taking value is less than \$5,000. Always appraise when owner requests it. Always appraise for donations or voluntary sales if value/damages are complex, are expected to exceed \$5,000 or the owner requests it. | 23 MRSA 153-B (2) 40 CFR 24.102(c)(1) |
| 5 | Administrative acquisition (a/k/a appraisal waiver) valuation (R65) | Negotiator/appraiser (performance of both activities by same person currently subject to \$5,000 limitation where taking involved or federal funds used) | When property is donated or voluntarily sold to MDOT, or when value of property to be taken is less than \$5,000; <i>only used</i> when the acquisition does not involve complex damages issues, and value can be determined without appraisal | 23 MRSA 153-B (2); 49 CFR 24.102(c)(2) R/W Manual 7-1.01 |
| 6 | Owner opportunity to accompany appraiser (R65) | Appraiser | Whenever appraisal is done. | 23 MRSA 153-B (2) 49 CFR 24.102(c)(1) R/W Manual 4-3.15 |

**Table A - Right-of-Way Process Guide
July 2003**

| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|---------------|--|--|--|--|
| 7 | Determination of fair market value (R65) | Negotiator/Appraiser and Valuation Reviewer, approved by Managers in accordance with APM 10 authority levels | All acquisitions | 23 MRSA 153-B (2), 154; 49 CFR 24.102(d) R/W Manual 4-5.01, 7-2.03 |
| 8 | NEPA APPROVAL (CE, EA, or EIS) | Environmental Services Representative | All acquisitions involving federal funds or project work needing federal permits or approvals | 23 CFT 710.305; National Environmental Policy Act of 1969 (NEPA) R/W Manual 1-1.05(b) Table 1-2 |
| 9 | Prompt written offer of the greater of fair market value or minimum payment (\$100 for temporary rights and \$250 for permanent rights) (normally meets just compensation requirement when taking, reasonable value requirement for donations and voluntary purchases; documented justification required if initial offer to deviate from fair market value) (R68) | Negotiator, face-to-face or by mail and telephone combination; requires explanation of scope of impacts, rights to be acquired by MDOT, how offer amount determined (basis for compensation) | All acquisitions, with fair market value to exclude considerations of benefits and detriments caused by the project. | 23MRSA 153-B (2), 154, 154-F; 49 CFR 24,102(d-e); 49 CFR 24.101 (a) and 24.108 Also Art. 1, Section 21 Maine Constitution; Fifth Amendment, U.S. Constitution R/W Manual 5-3 |
| 10 | Opportunity for owner to respond to offer and basis for offer; update offer | Negotiator | All acquisitions | 49 CFR 24.101(f),(g) R/W Manual 5-3.02(e) |

**Table A - Right-of-Way Process Guide
July 2003**

| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|---------------|--|--|---|--|
| 11 | Offset of value of any construction features MDOT Agrees to provide owner (other than those mitigation measures already reflected in determination of damages to property) | Negotiator and Construction Resident | All properties on which construction work is done for owners | State and federal policies Need reference to prohibition against using public moneys or property for private purposes. |
| 12 | MDOT may take possession of property rights only after payment of fair market value (except as indicated below) (R74) | Includes all Construction-related activities; see payment step, below. | All takings; all donations and voluntary acquisitions not involving a work permit (see below) | 23 MRSA 154(1) 49 CFR 24.102(1) R/W Manual 5-3.03(b) |
| 13 | Administrative settlement agreement, with documented justification | Negotiator-up to 10% over fair market value or \$500, whichever is greater; real estate manager for higher amounts where justified | Available for any acquisition until construction is complete | 23 MRSA 154 49 CFR 24.102(i) 23 CFR 710.105; 23 CFR 710.203(b)(1)(iv) R/W Manual 5-3.02(e) |
| 14 | Early entry under work permit (available under specified conditions and when owner is willing to grant permission for entry before acquisition or payment) | Negotiator with approval of Real Estate Manager | For federally-funded projects, can only be used in exceptional circumstances. | 49 CFR 24.102(j) (right of entry) |
| 15 | Early acquisition, protective buying, hardship acquisition (must meet specific qualifying standards) | Negotiator with approval of Real Estate Manager | On federally-funded projects, when purchasing property prior to completion of NEPA process | 23 CFR 710.501-503 (early acquisition, hardship and protective buying) (MDOT working on Policy) R/W Manual 5-7 |

**Table A - Right-of-Way Process Guide
July 2003**

| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|-------------------|--|--|---|---|
| 16 | Payment of fair and reasonable incidental costs to owners) (R74) | Negotiator sets amount, Acquisition/Condemnation Documentation Unit processes payments | When property is taken, donated, or purchased | 23 MRSA 161; 49 CFR 24.106 |
| 17 | Transfer of property rights to MDOT by deed or condemnation | Acquisition /Condemnation Documentation Unit in all cases | All projects | 23 MRSA 153B, 1154 R/W Manual 5-1.06 |
| 18 | Recording of condemnations/takings with the appropriate Registry by the R/W Research Section | R/W Mapping or Division Office | All projects with acquisitions of any type | 23 MRSA 154 R/W Manual 2-4.06(a) |
| 19 | Relocation housing Relocation advisory assistance Determination of availability of comparable replacement dwelling Advance or hardship payments (R58) | Relocation Specialist contracted by Relocation Manager (personal contact required) | When a resident (owner or tenant) or business must relocate in order for the project to occur | 23 MRSA 153-A, 23 MSA 154-D, 23 MRSA 241 and following: 23 MRSA 244-C; 23 MRSA 244-A(4) and 245-A 49 CFR Part 24, Subpart C R/W Manual 6-1.03 |
| 20 | Notice of Intent to Acquire or Notice of Eligibility for Relocation Assistance (90-day notice) (R77) | Negotiator by letter cosigned by his/her Real Estate Manager | When residents of a dwelling or a business is required to move; must give no less than ninety (90) days before the person or business may be required to move; in the case of residential relocation, cannot start the 90-day clock until replacement housing is available | 23 MTSA 154-D; 49 CFR 24.203 R/W Manual 6-4.03 |

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| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|---------------|---|--|---|---|
| 21 | Notice of Intent to Acquire or Notice of Eligibility for Relocation Assistance (90-day notice) (R77) | Negotiator by letter cosigned by his/her Real Estate manager | When residents of a dwelling or a business is required to move; must give no less than ninety (90) days before the person or business may be required to move; in the case of residential relocation, cannot start the 90-day clock until replacement housing is available | 23 MRSA 154 |
| 22 | Certification that legal and physical possession of all property rights needed for the work completed in conformity with applicable laws and procedures, or rights already owned by MDOT; that clearances and relocations are complete (unless exemption approved); and that all utility and railroad work arrangements completed (X21) | Program Managers in Augusta, Assistance Division Engineers in Divisions, both with recommendation of Real Estate manager. Certification is in writing, | All projects, including those for which no new rights are required | 100% State-funded Projects: administrative policy Federally-funded Projects 23 CFR 635.309 (b), (c), (g), (h) R/W Manual 1-2.02(b) |
| 23 | Negotiation over amount of just compensation for up to 60 days after taking, then referral to State Claims (R68) | Negotiator | When property is taken | 23 MRSA 155 R/W Manual 5-3.03(A) |
| 24 | Legal settlement agreements (R68) Acquisition Review Comm. | Legal Services | Any property acquisition after construction is completed and there is a referral to State Claims | 23 CFR 710.105(b) R/W Manual 5-6 |

Table A - Right-of-Way Process Guide
July 2003

| Ref. # | R/W Activity (Activity Code #) | Who Does It/How Is It Done | When Required | Source of Requirement |
|---------------|--|---|----------------------------|--|
| 25 | Records of negotiation contacts (R68) | Negotiator (signed and dated: including date and place of contact, parties of interest contacted, offers made, counteroffers, reasons not settled, recommendations for future action, other pertinent data) | All acquisitions | 100% State-funded projects: administrative policy Federally-funded projects: 49 CFR 24.9, 23 CFR 710.201(f) R/W Manual 5-2.02(3) |
| 26 | Delegation of relocation function to qualified federal, state, or municipal agency (R77) | Real Estate manager | Optional | 23 MRSA 245 49 CFR 24.2(4) R/W Manual 8; 8-2.12 |
| 27 | Advance payment of relocation benefits (R77) | Real Estate manager | Hardship cases only | 23 MRSA 245-A R/W Manual 607(15) |
| 28 | Commissioner's final determination of eligibility for relocation benefits (R77) | Commissioner, after review of appellant's submission and a report from real estate manager | Appeal by person aggrieved | 23 MRSA 246 R/W Manual 6-3.10 |
| 29 | Agreement to sell or otherwise dispose of property rights (including control of access) (R74) | Property Management Specialist in Legal Division Services after valuation of rights to be disposed (FHWA approval required in some cases) | All dispositions | 23 MRSA 61 23 CFR 710.403-409 R/W Manual 7-1, 7-5 |
| 30 | Agreement to lease or license use of property within the limits of the right-of-way (airspace) (R74) | Property Management Specialist after valuation of rights disposed (FHWA approval required in some cases) | All dispositions | 23 MRSA 61 23 CFR 710.403-409 R/W Manual 7-6 |

Table A - Right-of-Way Process Guide
July 2003

| | | | | |
|-----------|--|--|--|---|
| 31 | Acquisition records for each parcel (R74) | Everyone, with oversight by applicable Real Estate Manager | All acquisitions, retained for minimum of three (3) year after approval of final project voucher by funding entity | 100% State-funded projects: administrative policy Federally-funded projects: 49 CFR 24.9, 23 CFR 710.201(f) R/W Manual 5-2.01 |
| 32 | Acquisition records for each parcel (R60) | Everyone, with oversight by applicable real estate manager | All acquisitions, retained for minimum of three (3) year after approval of final project voucher by funding entity | 100% State-funded projects: administrative policy Federally-funded projects: 49 CFT 24.9, 23 CFR 710.201(f) |
| 33 | Adopt guidelines, procedures, and definitions for relocation program | Real Estate Manager in Program Services | Optional | 23 MRSA 245-B |

TABLE B - Minimum Widths for Right of Way Acquisition

| Road Classification & Projected AADT | Paved Width | Traveled Way Width | Side Slope | Design Speed | Proposed Minimum R/W Width (one side) | Total R/W Width Minimum |
|--------------------------------------|-------------------------------|--------------------|------------|---------------------------------|---------------------------------------|-------------------------|
| Minor Collectors | | | | | | |
| Under 1000 | 12'/13' (3.0m/3.9m) | 10' (3.0m) | 1:3 | 40 mph(60 km/h) | 33'(10m) | 66' (20 m) |
| 1000 to 4000 | 14' (4.2 m) | 10'/11'(3.0m/3.3m) | 1:3 | 40 mph(60 km/h) | 33'(10m) | 66' (20m) |
| Over 4000 | 15'/18'(4.5m/5.4m) | 11'/12'(3.3m/3.6m) | 1:3 | 45 mph(70km/h) | 40'(12m) | 80'(24m) |
| Major Collectors | | | | | | |
| Under 1000 | 12'/13'(3.0m/3.9m) | | 1:3 | 45 mph(70km/h) | 33'(10m) | 66'(20m) |
| 1000 to 4000 | 14' (4.2m) | | 1:3 | 45 mph(70km/h) | 33'(10m) | 66'(20m) |
| 4000 to 6000 | 15' (4.5m) | | 1:3 | 45 mph(70km/h) | | 66'(20m) |
| Over 6000 | 18' (5.4m) | | 1:3 | 45 mph(70km/h) | | 80'(20m) |
| Minor Arterials | | | | | | |
| Under 1000 | 14' (4.2 m) | 10'/11(3.0m/3.3m) | 1:3 | 45 mph(70km/h) | 33'(10m) | 66' (20 m) |
| 1000 to 6000 | 14'/15'/18' (4.2 m/4.5m/5.4m) | 10'/11'(3.0m/3.3m) | 1:3 | 45 mph(70 km/h) | 33'(10m) | 66' (20m) |
| 6000 to 8000 | 18'(5.4m) | 11'/12'(3.3m/3.6m) | 1:4 | 55mph(90km/h) | 40'(12m) | 80'(24m) |
| Over 8000 | 20'(6.0m) | 12'(3.6m) | 1:3 | 55mph(90km/h) | 50'(15m) | 100'(30m) |
| NHS (Non-interstate) | | | | | | |
| 35 to 50mph (50 km/h-80km/h) | | 12'+12' | | 35 mph-50mph(80km/h) | 40'(12m) | 80'(24m) |
| ≥50mph | | (3.6m+3.6m) | | 50+mph(80+km/h) | 50'(15m) | 100'(30m) |
| 4 lane | | | | 55+mph(90+km/h) | 60'(18m) | 120'(36m) |
| Urban | | | | | | |
| With Curb | | | | | 10'to15'(3m to 4.5m) Behind Curb | |
| No Curb | | | | <35mph(<50km/h) >35(>50km/h) | 24.75(7.5m) 33'(10m) | 49.5'(15m) 66'(20m) |

Notes:

1. Minimum utility offset to face of pole.
2. Minimum utility offset with pole and mast arm, does not provide aerial clear zone rights beyond R/W limits.
3. Minimum utility offset based on 3-ft deep ditch with pole 2 ft behind ditchline, includes pole and mast arm.
4. Truck lanes or additional lane/pavement width will increase minimum offsets by the added width.

SECTION E

Environmental:

Natural and cultural resources often exist along highway projects. Many of these resources such as wetlands, public parks, and historic sites are protected by law for public benefit. Planning and design decisions such as setting roadway alignment and widths, replacing and rehabilitating culverts, and altering drainage patterns or volumes can all directly affect these resources by degrading or destroying them. Such impacts can usually be permitted under specific circumstances but, as impacts increase, permit requirements become more costly and time-consuming. Design elements can also indirectly affect resources and abutting private property by disturbing or exposing a hazardous substance, such as an abandoned, damaged gasoline tank; by channeling storm water toward a wetland or water body, carrying and depositing pollutants and sediment; or by impeding an established travel corridor for moose (land) or fish (water). These conditions can also affect structural integrity, safety or scenic quality of a roadway.

Regulations generally require that we avoid affected resources. Next, if impacts are unavoidable, they should be minimized. Finally, if impacts are unavoidable and exceed a set threshold, compensation or mitigation can be required. One of the most common examples of this include realigning a section of roadway through a wetland, causing a specific area of wetland to be filled in. Regulatory agencies approve where and how these wetlands must be replicated. Another example is the taking of a portion of a historic property, or changing the character of a roadway so it visually affects the setting or character of a historic house. That impact must be evaluated and, if it is found adverse, mitigation must be provided according to regulations. These and other forms of compensation or mitigation can be costly and can extend the project schedule.

The best approach is to avoid compensation, if that is feasible. If not, project schedules and budgets need to be adjusted to allow MDOT to comply with these requirements. Because we continually return to the same agencies for approvals on our projects, it is important that we approach each project responsibly. Developing credibility and a good rapport with agencies will facilitate agency approvals on future projects.

Projects need to be screened for the presence of all types of resources. Some of the natural resources protected by state and federal regulations include wetlands, surface and ground water, fish (habitat and passage)¹, migratory birds, rare plants, and animals¹.

¹ The Department's Fish Passage Policy and Design Guide, Best Management Practices For Erosion and Sediment Control, and more information on animal/vehicle collision issues are available at www.maine.gov/mdot/under publications.

Cultural resources such as archeology sites and architecturally historic structures (e.g., buildings, bridges) are also protected by regulations. MDOT coordinates with a number of agencies such as the Army Corps of Engineers, Maine Department of Environmental Protection, Maine Department of Inland Fisheries and Wildlife, and Maine Historic Preservation Commission, who review projects for compliance with existing laws and regulations.

The FHWA regulates historic resources and publicly owned parks, recreation areas, and wildlife and waterfowl refuges, which are known as “4 (f)” properties. FHWA requires a rigorous search for alternatives before it will consider allowing impacts to such properties.

Temporary erosion and sediment control measures are required during construction on all projects.¹ More protection is needed if a project is closer to a surface water body and if the water body is designated as “sensitive” by regulatory agencies. If the design of a project causes it to encroach on lakes, streams, or other water resources; changes drainage patterns; or increases impervious area above set thresholds, permanent structures may need to be designed and installed to maintain water quality and quantity at preconstruction conditions. This increases construction costs.

By doing a “whole project” assessment and using environmentally sensitive measures, other important social and economic impacts can usually be avoided. For example, selecting appropriate design and roadside treatments (e.g., grading, seeding, mulching, planting) can lower maintenance costs and help protect the character of a roadway. In another case, locating and avoiding an unauthorized dump or spill site of hazardous substance early in the project design can save MDOT from liability and project costs. If there is no feasible alternate design and MDOT must clean up the site, this can usually be completed without affecting the project schedule. Carefully considering potential alignments, widths, and other elements can also help a designer avoid disturbing stable areas and exposing a larger area of soil than necessary.

The highly qualified professionals in the Environmental Office keep up on laws and regulations, politically charged environmental resource issues, and new technologies to help all programs within MDOT deliver safe, effective, and legal projects. By working as part of the project team, ENV staff and Division Coordinators identify potential problems; assess what needs to be done; coordinate, negotiate, and track agency approvals; and provide environmentally sound design recommendations so the best project decisions can be made as early as possible. These decisions serve the entire life

¹ The Department’s Fish Passage Policy and Design Guide, Best Management Practices For Erosion and Sediment Control, and more information on animal/vehicle collision issues are available at www.maine.gov/mdot/under publications.

cycle of the project, from planning and design to construction and maintenance. When this process is applied effectively, time and money can be saved.

The best ways to get environmentally sound projects are to start early, be flexible and contact your Environmental Coordinator and ENV staff to work with you throughout the design process to advise you, to avoid or lessen project delays, and to keep overall costs down.

¹ The Department's Fish Passage Policy and Design Guide, Best Management Practices For Erosion and Sediment Control, and more information on animal/vehicle collision issues are available at www.maine.gov/mdot/under publications.

SECTION F

Public Participation Process

The MDOT's public participation process provides an opportunity for local governmental bodies and the public to review and comment on transportation projects. When deciding what level of public participation is appropriate, one should look at the National Environmental Policy Act (N.E.P.A.) and the Sensible Transportation Policy Act (STPA).

There are several different levels of public participation that may be used depending on the scope and complexity of each project. The public process is tailored accordingly. On all projects, the city/town official shall be contacted about the scope of the project for input. Whenever a project impacts property, the abutters shall be notified.

The following paragraphs describe the different levels of public participation.

I. Letter of Intent

A letter of intent to the city/town, county commissioner consists of a letter, and a map to officials of each local entity where the project is located. The letter and map should be prepared by the lead unit and sent 6 to 12 months prior to advertising. This letter should also alert officials of the 5 year moratorium on highway openings after the project is completed. The letter of intent is typically used on Pavement preservation projects and low end Collector Highway Improvement Projects.

II. Preliminary Public Meeting

The preliminary public meeting is held prior to any meaningful design work and is intended to solicit comments and concerns from the town or city involved, abutters and the general public. These comments and concerns can then be seriously considered and addressed as a part of the design process and also addressed at the public meeting to note for the records that they were considered. Preliminary public meetings are held when a project has been identified as having substantial public interest or the project manager has determined there is a need.

Normally a survey plan or aerial photograph is utilized without showing any proposed design. Required are public notices in local newspapers, letters and notices to town officials, state legislators and county representatives, abutters, MDOT PERSONNEL and the court reporter. The Public Notice is an important early step in notifying the public of our intention to improve a transportation

facility. If we can get their attention with this early notice and set a tone that encourages open communication, public and official involvement in project development will begin earlier and be more productive.

Begin planning the meeting by deciding and clearly stating the purpose for holding the meeting. Be prepared to explain what's been identified as the purpose and need for the project, what activities come next and what the time frames are. The public will want to know who makes the decision when there are alternatives, such as alignments or scope of work.

At the preliminary public meeting, MDOT or its designated representative will:

- (1) Outline the transportation deficiency and need in terms of safety, congestion, substandard infrastructure, or other appropriate measures.
- (2) Inform of the schedule and budget.
- (3) Describe available information concerning the social, economic. Energy, and environmental impacts of the project, including the range of mitigation measures and transportation enhancement measures which could minimize such impacts.
- (4) Solicit public comment on the project.
- (5) Invite ideas and/or specific features from the public.
- (6) Where appropriate, invite the town to form an advisory committee or invite existing town committees to meet regularly with MDOT.

III. Informational Public Meeting

This meeting is an intermediate public involvement process and its purpose is to share information and seek input on a project to make a decision and move forward. This type of meeting is held to provide preliminary information to the public on a proposed project or the status of a project. The preliminary design to date is usually presented and MDOT personnel are available to answer questions from the public at a prescribed time and place. They are usually used when a one on one meeting with the public might be helpful. The project would be substantial or have significant public interest. The type of project involved may be a CHIP project. Another instance may be a project that has a long time span or is controversial, so that informational meetings are held in addition to a public meeting.

IV. Informal Public Meeting

When a project requires a public meeting but does not impact a large group of people, an Informal Public Meeting may be held. The same project information in a public meeting, described below, is presented and public input is sought, but there is no formal presentation. The Project Manager will be present to answer questions and concerns as well as receiving input from the public on a one-on-one basis. Public notification will be the same as for a Public Meeting.

V. Public Meeting

Several options are available for a public meeting as follows:

A town council meeting may be used if a project necessitates more than just a letter to the town and public notice. They may be useful when there are a small number of butters involved or when there is expected to be little controversy. Examples of these may be bridge deck replacements or intersection improvements. The Project manager should contact the town to get on the council meeting agenda and put a notice in the local newspaper inviting the public. At the meeting the Project Manager will explain the scope of the project, the impacts of construction and any right of way issues. The Project Manager will then seek public input and respond to any questions.

A preliminary meeting with the city or town may be held to review the preliminary design with local officials to identify any concerns they may have prior to a public meeting. It should also address concerns and input from the preliminary public meeting. This meeting will be held separately, just prior to a public meeting on the same day or occasionally a phone call to the town manager describing the project has sufficed. On some projects a presentation may be made during a council meeting. Arrangements for the meeting are normally made by the Project Manager. He/she should be prepared with a specific list of things to cover. Discuss what is planned and listen carefully to the responses. Take good notes, either during or just following the meeting, so that the results of the small group discussion will be available in the broader, public meeting and will be open to public scrutiny. Documentation of these meetings should be part of the Project Development Report.

Public meetings to explain the preliminary design are held before the formal decisions on a project are made. They are most effective as part of an overall public involvement program in which they offer the public a final opportunity to comment just before decision making. The lead unit has responsibility for scheduling and carrying out these meetings. The lead unit will prepare and distribute a record consisting of a summary or transcript following the meeting.

When a reconstruction or a significant or substantial public interest transportation construction project has been determined to be the best solution to the designated transportation deficiency or need, MDOT will hold a public meeting at which it will:

- (1) Have a moderator who makes the opening statement and conducts the meeting.
- (2) Explain the scope of the project.
- (3) Explain how the selected alternative was decided upon or suggest various alternative solutions to the transportation deficiency or need. Explain how input from the preliminary meeting has been or not be incorporated.
- (4) Describe available information concerning projected life-cycle costs and operational costs of the alternatives.

Maine Department of Transportation Shoulder Surface Type Policy

Shoulder surface type will be based on the following policy. Projects currently programmed through current or past Biennial Transportation Improvement Programs (BTIPs) with gravel shoulders, will usually remain as programmed, as funds are not available to add shoulder paving. Therefore, with pavement preservation projects, this policy will fully become effective with the 2005-2005 BTIP.

A.) On the National Highway System - All shoulders shall be paved as part of new construction, highway improvement, or pavement preservation projects.

B.) Off the National Highway System -

1.) Where shoulders are warranted, as determined by state standards on new construction or highway improvements, the shoulders will be paved. Composite shoulders may be used for context sensitive design reasons. When the proposed pavement width of a composite shoulder is less than four feet, the lead unit will notify the Bicycle Coordinator.

2.) Pavement preservation projects

a.) Existing paved shoulders will be resurfaced.

b.) Pavement preservation projects will have gravel shoulders paved where the design year Summer Average Daily Traffic (SADT) is greater than 4000.

c.) Pavement preservation projects where the design SADT is less than 4000, shoulders will be paved if the following applies; otherwise, shoulders will be gravel. If there is any uncertainty as to whether the criteria listed apply in any given situation, the lead unit will contact the Bicycle Coordinator.

i.) A bicycle route that is designated in the Department's bicycle plan.

ii.) On recreational use highways. These highways are defined by individual traffic counters or included in group III - recreational highways.

iii.) In villages, or adjacent to parks, schools, beaches, fairgrounds, recreation facilities, work centers, or other "built-up" areas to accommodate pedestrian and bicycle usage. This may include extending paved shoulders to a facility adjacent to the village.

- iv.) Complete gaps on highway segments where the majority of shoulders are already paved.
- v.) All guardrail locations.
- vi.) Between short gaps of guardrail runs and closely spaced side roads.
- vii.) Areas adjacent to side roads with many turning movements.

C.) Hot Maintenance Mulch - regardless of system

- 1.) Existing gravel shoulders will remain gravel.
- 2.) Existing paved shoulders will be resurfaced during Hot Maintenance Mulch (HMM) paving when one of the following conditions apply. Otherwise, existing paved shoulders will not be resurfaced.
 - a.) A lip, 16 mm or greater, exists at the edge of the traveled way as a result of previous resurfacing of the traveled way and not resurfacing the shoulder.
 - b.) The existing paved shoulder is in such poor condition that it has an adverse impact on shoulder maintenance and use by pedestrians and bicyclists.
- 3.) Shoulders being resurfaced under HMM contracts should not require extensive “hand work” which is outside the scope of work for HMM. An example of extensive “hand work” includes paved “spoon ditches”.
- 4.) If a municipality desires resurfaced shoulders, which in the opinion of the Department do not meet the above criteria, the shoulder resurfacing can be completed with the municipality responsible for the cost.
- 5.) When shoulders are resurfaced, painting of pavement markings (edge line, etc.) is the responsibility of the entity who normally maintains the pavement markings.

D.) Glossary

Composite Shoulder - Multiple surface types across the width of a shoulder.
Highway Improvement - Major rehabilitation or reconstruction of a roadway.

Hot Maintenance Mulch - A pavement treatment used as a holding action until another level of treatment can be affected.

National Highway System (NHS) - A highway system, consisting primarily of existing Interstate routes and a portion of the federally designated principal arterial highways. These roads are considered most important to Interstate travel and national defense, they connect with other modes of transportation, and are essential for international commerce.

Pavement Preservation Program - A program that resurfaces or rehabilitates the pavement structure on highways that are built to modern standards to extend the life of the pavement. Included are PPM, Level 2 and 3 highway resurfacing projects, each level describing the intensity of work effort.

Spoon Ditches - Swale type shoulders that are formed to transport highway runoff away from the travel way.

Summer Average Daily Traffic (SADT) - The average traffic on a weekday during the months of July and August.

Approved by:

John E. Dority
Chief Engineer

This policy shall apply to all Maine Department of Transportation projects except routine maintenance and repair operations and projects on local roads. Such exceptions are governed by their own respective policies. Guardrail and guardrail terminal application shall be based on the highway system designation as set forth in the following sections.

National Highway System

Guardrail

All new guardrail installed on Bridge or Highway projects shall be National Cooperative Highway Research Program *Report 350* (NCHRP 350) compliant. Guardrail Type 3d- Single Rail shall be used on the interstate and Guardrail Type 3c- Single Rail off the interstate.

All existing guardrail not NCHRP 350 compliant (i.e. guardrail having steel offset brackets) shall be upgraded according to the following conditions:

- On Highway Improvement or Reconstruction projects, guardrail must be upgraded to NCHRP 350 compliance regardless of condition.
- On Pavement Preventive Maintenance (PPM), Level 2 Overlay, and Pavement Rehabilitation projects, NCHRP 230 compliant guardrail needing no work or in need of height adjustment only may stay in place and any extension may be done in kind (i.e. if the existing guardrail is Type 3b then extensions may be done with Type 3b). This shall apply even if there is other guardrail work included in the project scope. Guardrail on these projects shall otherwise be upgraded to NCHRP 350 compliance.
- On Bridge projects which require guardrail replacement or relocation, guardrail must be upgraded to NCHRP 350 compliance.
- On Bridge projects which require no guardrail work, guardrail may stay in place as long as it is NCHRP 230 compliant and is adjusted to the proper height.

Consideration shall always be given to the potential safety and economic benefits of upgrading the guardrail to be NCHRP 350 compliant.

Guardrail Terminals

All new guardrail terminals installed on Bridge or Highway projects shall be NCHRP 350 compliant. The Buried in Backslope and the Flared End terminals are the preferred methods of terminating barrier. The Department currently has three accepted NCHRP 350 compliant flared end terminals: The Fleet 350 (FLared Energy Absorbing Terminal), the SRT 350 (Slotted Rail Terminal), and the Regent. Other NCHRP 350 compliant terminals may be used if they meet the Department's requirements. Each of these systems must be installed with a 1220 mm (4 ft) flare offset. Tangential End terminals shall only be used where adequate vehicle recovery area or adequate space behind the terminal can not be provided. Among others, the ET-2000 and the CAT (Crash Cushion Attenuating Terminal) are NCHRP 350 compliant Tangential End terminals approved by the Department.

All existing guardrail end terminals on Bridge or Highway projects not NCHRP 350 compliant shall be upgraded to NCHRP 350 compliance.

Maine Department of Transportation
Guardrail and Guardrail Terminal Policy
Non-National Highway System

July 2003
supersedes July 11, 2001

Guardrail

All new guardrail installed on Bridge or Highway projects shall be NCHRP 350 compliant.

All existing guardrail not NCHRP 350 compliant (i.e. guardrail having steel offset brackets) shall be upgraded according to the following conditions:

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- On Bridge projects which require no guardrail work, guardrail may stay in place as long as it is NCHRP 230 compliant and is adjusted to the proper height.

Consideration shall always be given to the potential safety and economic benefits of upgrading the guardrail to be NCHRP 350 compliant.

Guardrail Terminals

All new guardrail terminals on Bridge or Highway projects shall be installed according to the following condition:

- If A.A.D.T. is less than 500, terminals may be Low Volume Guardrail Ends.
- If A.A.D.T. is 500 or more, terminals shall be NCHRP 350 compliant.

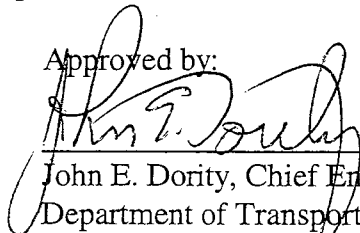
The Buried in Backslope and the Flared End terminals are the preferred methods of terminating barrier. Tangential End terminals shall only be used where adequate vehicle recovery area or adequate space behind the terminal can not be provided. Acceptable terminals are listed in the National Highway System section above.

All existing guardrail terminals on Bridge or Highway projects shall be upgraded to NCHRP 350 compliance with the following exceptions:

- If A.A.D.T. is less than 500, terminals may be Low Volume Guardrail Ends.
- Existing BCTs on all projects on collector highways with no other guardrail work included in the scope may be left in place if the BCT has not been hit and if there are no crashes recorded at that location.
- All existing MELTs in good condition may be left in place.

If significant repair or replacement is necessary, the replacement shall be NCHRP 350 compliant.

Approved by:

 07/03/03
John E. Dority, Chief Engineer
Department of Transportation

STATE OF MAINE

Inter-Departmental Memorandum

Date 6/3/93

To Holders of Maine Highway Design Guide

Dept. Transportation

From Charles Valley, Hwy. Design Engineer

Dept. Transportation

Subject Sidewalk Policy – Highway Policy Committee Memo #5 (REVISED)

This policy is intended to revise and replace the policy on sidewalks and bikeways issued in 1975 by then Commissioner Roger Mallar. It is intended to address sidewalks only, as a bikeway policy will be developed separately as necessary. The following is the basic policy under which the Department will operate in the foreseeable future, except when CNAQ or Enhancement funds are involved:

1. It is the Department's policy to replace existing sidewalks in kind on any reconstruction, rehabilitation or resurfacing project where there is an existing sidewalk. The funding for replacement of the sidewalk in kind will be the same as the funding for the reconstruction, rehabilitation or resurfacing project. This will apply whether the sidewalk is being fully reconstructed or just overlaid with hot bituminous pavement. An exception to the above may be when the Department and Town/City agree in writing to eliminate a sidewalk.
2. When a municipality or town requests that sidewalks be constructed as part of a project in an area where there are no existing sidewalks, it would be the municipality's responsibility to pay all of the non-federal share of the cost of the new sidewalk. When the project is not federally funded, it would be the municipality's responsibility to pay 50% of the State's share of the cost. The cost is intended to include gravel, pavement and any additional construction features made necessary by widening for the sidewalk such as retaining walls or barriers. It does not include Right of Way.
3. When a municipality or town requests that sidewalks be constructed as part of a project in an areas where there are no existing sidewalks after a project has been advertised, the municipality's responsibility will be the same as in Item 2 except that it will also be responsible for the total cost and acquisition of any right of way necessary to construct the new sidewalk.
4. When, as a part of an ongoing project, an existing sidewalk is reconsgructed but the municipality wishes to put down a surface other than that which existed previously, it would then be the municipality's responsibility to pay all of the non-federal share of the additional cost for the requested surface. As an example, a city requests that rather than putting down not bituminous pavement grading "D" that we construct a brick sidewalk...then the non-federal share of the additional cost of the brick surface must be paid for by the town or city involved.

Access Management

The purpose of this policy is to provide guidance to the Regional and Urban/Arterial Program Project Managers when developing plans affecting a rural arterial or major collector where access points currently exist or where new access points are proposed.

Studies show that as the number of access points increase on a roadway, the number of crashes increase and the effective operating speed decreases.

Guiding Principles:

1. On non-arterials, Maine DOT's policy prioritizes safety over speed management; speed management policy affects only rural arterials posted at 40 MPH or higher that carry at least 5,000 vehicles per day for the majority of the "corridor". (See the rule/map for more specifics on this issue.)
2. The intent of Maine DOT's new driveway/entrance rules is to ensure that all **new** access points meet the appropriate standards.
 - a. Property owner's requesting additional access points should be directed to the Division Office that has jurisdiction over the section of roadway.
 - b. They will be required to fill out an application for a new or modified (see Item 3 below) access point.
 - c. Designers should not use new access points as a bargaining tool in Right of Way negotiations.
 - d. The intent of the new rules is to have all new access points meet the standards to the greatest extent possible.
3. The adopted rules have no jurisdiction over any existing access points, **unless a change to the intensity of the use or the physical location or grade of the access point** is being requested by the land owner.
4. The adopted rules may only provide guidance to Maine DOT initiated actions (i.e. reconstruction, rehabilitation, overlays.)
 - a. The designer should look at the number and width of the existing access point(s) serving an individual property. If it will improve safety and allow business activity to continue without disruptions, designers should pursue narrowing any excessively wide (in excess of 42') access point or remove one or more of multiple access points serving the same site. Examples include:
 - i. Businesses with wide open driveways
 - ii. Businesses with more than two access points
 - iii. Residential lots with more than two access points
 - iv. Properties with access points on an intersection radius
 - v. Properties that have a high crash rate

The listed items above are meant as examples and are not meant to be construed as items that must be done on every project. Common sense will go a long way in determining which items should be done and not done. Not

every item is worth using police powers to get done. Not every battle is worth fighting. Hopefully this guidance will help make a given situation better than it is today.

- b. While the rules do not necessarily apply to Maine DOT actions on construction projects, the designer should make an effort to make sensible improvements to unsafe or otherwise non-conforming access (sight distance, width, use of right of way or road for maneuvering onto/off lot, grade entering roadway, proximity to other access points when on a mobility arterial etc.).
- c. In selecting access points to potentially modify, consideration should be given to AADT, number of crashes that have occurred at the specific access in the past 3 years, the horizontal and vertical alignment at the specific access (as relates to posted speed and resulting sight distance) and the nature of the land use served by the access point.
- d. With respect to the land use, consideration should be given to the number of daily/peak hour trips that may be expected at the site as well as the types of vehicles that are likely to enter and exit. Special attention should be given to commercial properties, especially those at intersections.
 - i. Access points should be located a minimum of 75 feet from any intersection, as measured from the intersection lines of the edge of shoulders from both roadways.
 - ii. In no case should an access point be located on the radius located between both roadways.
 - iii. Any changes of access points to meet the corner clearance standard will go a long way toward improving the safety at the intersection.
- 5. Discuss the proposed modification with the property owner. If the proposed improvement generates controversy with the property owner, attempt to negotiate to a mutual position (i.e. how much of the proposed improvement can be supported by the owner?).
- 6. The intent of this guidance is to make mutually agreeable safety improvements without delaying the project's delivery.
 - a. If the advertising date is approaching and agreements haven't been made with the property owners, move forward with the project without those access changes.
 - b. Keep a record (notes for the file) of any attempt to reach agreement.

Any relocation that improves sight distance and any reduction made in the number and/or width of access points will be considered a success!

Exclusive Turnlane/Auxiliary Lane Criteria

Table 8-4

| Design Element | Design Speed | Traffic Control | Criteria (See Notes 1,6,7) | |
|--|--------------------------------------|---------------------------------|---|---|
| Taper Rate | < 40 mph | All | $W \times S^2/60$ $W \times S$ | |
| Deceleration Length (L_d) (See Notes 2,3) | 30 mph 40 mph 50 mph 60 mph | All (See Note 2) | 120 feet 165 feet 265 feet 370 feet | |
| Storage Length (L_s) (See Note 4) | All | Unsignalized (See Note 4) | Turning DHV (VPH) | L_s |
| | | | <61 61-20 121-180 >180 | Minimum Length 100 feet 150 feet >200 feet |
| | | Signalized (See Notes 4,5,6) | Based on 1.5-2.0 times the average number of cars that will store in the turning lane per cycle during the design hour. | |

Notes:

- Minimum Length. The minimum length of an auxiliary lane will be the taper length (L_t) plus the Storage Length (L_s).
- Use of Deceleration Length. The designer should consider providing the deceleration length (L_d), if practical at the following:
 - all legs of a signalized intersection (except the truncated leg of signalized T-intersection); and
 - the free flowing legs of a stop-controlled intersection for the left-turn lane

Deceleration length need not be considered at stop-controlled legs, nor at the truncated leg of a signalized T-intersection, nor at a right-turn lane for the free-flowing leg at a stop-controlled intersection.
- Measurement of Deceleration Length. As illustrated in figure 8-20 , the deceleration length (L_d) also includes the taper length (L_t). The L_d values in the table assume that the turning vehicle is traveling at a speed of 5 mph below the average running speed before entering the taper.
- Minimum Storage Length. For all intersections where traffic volumes are too low to govern, the minimum length will be 50 feet, ($T < 11\%$) or 80 feet ($T > 10\%$), where T is the percent of trucks turning.
- Coordination. The Traffic Engineering Division should provide the storage length (L_s) required at signalized intersections.
- Storage Length of Through Traffic. In addition to the table criteria, the length of turning lanes at signalized intersections should exceed the calculated storage length in the through lane adjacent to the turning lane for the design hour.
- English (W = width of the travel lane in feet, S = design or posted speed of roadway in mph).

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

MEMORANDUM

To: Highway Policy Committee

From: Stephen Landry, Traffic Engineering

cc: File

Date: March 19, 2002

Subject: Crosswalks ☐

Crosswalks are marked areas where pedestrians can cross a roadway. By law in the State of Maine, any vehicle must yield the right-of-way to a pedestrian who has entered a crosswalk. This law makes it imperative that crosswalk placement, painting and usage be done in a uniform way.

1. All crosswalks shall be six (6) feet wide and marked with white paint as shown on the attached sheet.
2. All crosswalks shall meet the criteria put forth in the American's with Disabilities Act (ADA).
3. All crosswalks should extend from safe landing zone to another. A safe landing zone is an area where a pedestrian is safe from vehicle conflict while waiting to cross or when finished crossing. Islands, walkways and sidewalks are typically considered safe landing zones, while driveways (under normal circumstances) and parking areas are not considered safe landing zones.
4. Crosswalks shall be placed in areas where there is sufficient stopping sight distance for the posted speed limit. Crosswalks should be lighted for nighttime use.
5. Crosswalks shall have the appropriate signage (W11-2 series from the Manual on Uniform Traffic Control Devices). These signs shall be black symbol on yellow background. There is also an option for black symbol on fluorescent yellow green background. Sign colors should not be mixed in any area.
6. Crosswalks should be located a minimum distance of 500 feet apart.
7. Crosswalks shall be installed in areas where the speed limit is 35 mph or less.

8. No parking shall be allowed within 20 feet of any crosswalk. Signs should be installed indicating that no parking is allowed. (See attachment)
9. Prior to installing crosswalks, towns shall enact ordinances dealing with crosswalks. At a minimum, Items 1 through 8 should be included.

Figure 3B-15. Typical Types of Crosswalk Markings

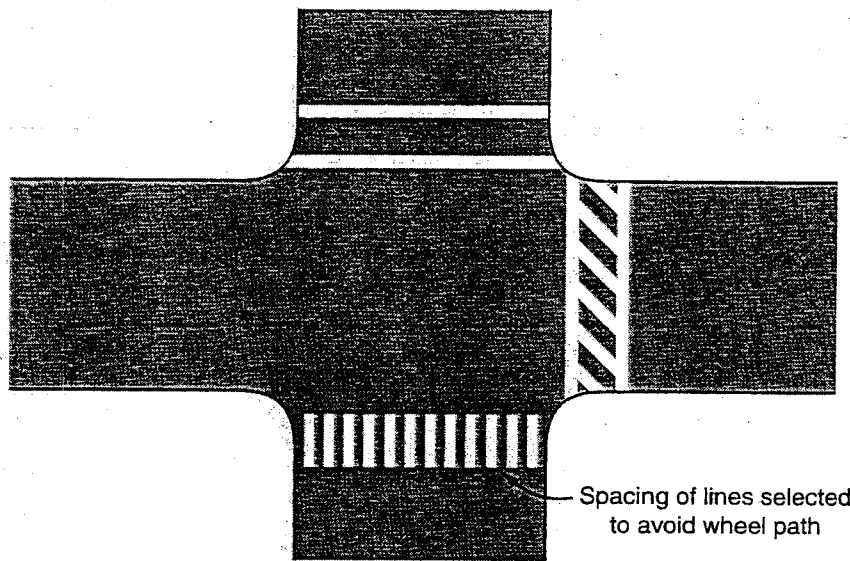


Figure 3B-16. Typical Crosswalk Markings for Exclusive Pedestrian Phase That Permits Diagonal Crossing

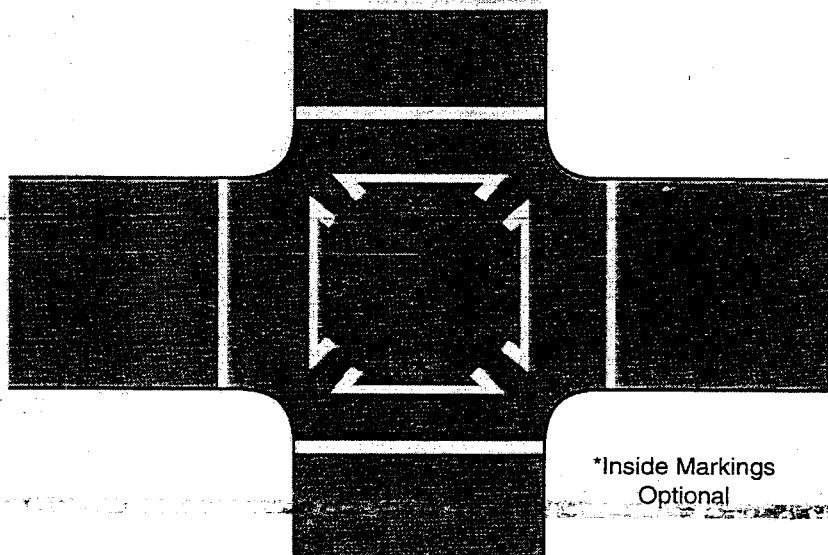
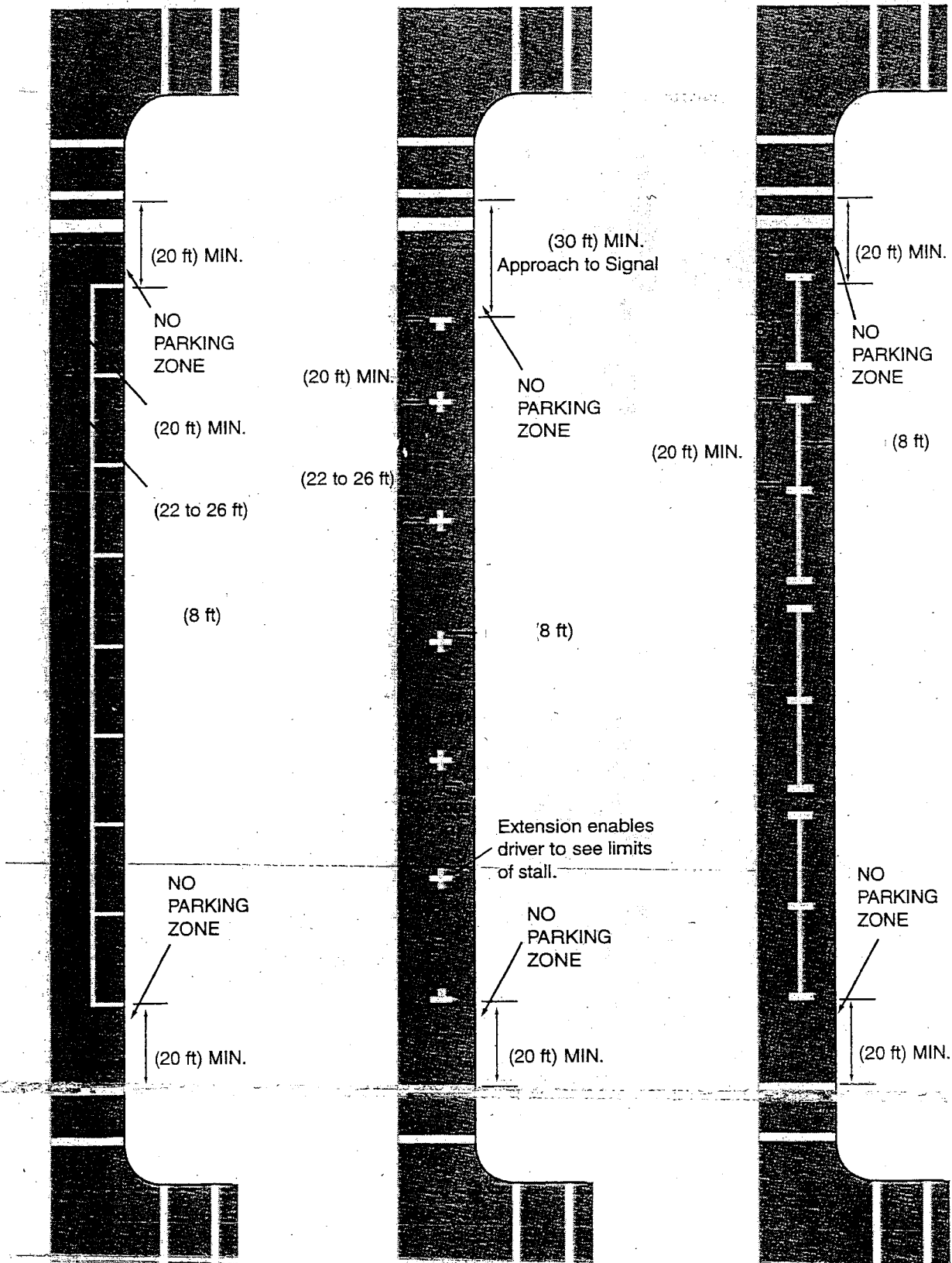


Figure 3B-17. Typical Parking Space Markings



State of Maine
Maine Department of
Transportation

John E. Dority
Chief Engineer
16 State House Station
Augusta, ME 04333-0016

Phone: (207) 287-2551
Fax: (207) 287-8300

Memorandum

Date: April 24, 2001

To: Warren Foster, Carl Croce, Marc Guimont,
Jerry Casey, David Bernhardt, Bruce
Ibarguen

From: John E. Dority, Chief Engineer

Subject: Flush Traffic Control Island on Capital
Projects

OR STAMPED HMA

The use of painted traffic islands at intersections shall be discontinued. If the design of an intersection requires an island or islands, they should be built either of flush concrete or raised curb, preferably granite either edging or vertical curbing depending upon the application.

Other permanent treatments to produce a distinguishable and durable flush island can be used, subject to the approval of Traffic Engineering.

The use of painted islands is being discontinued because of the extremely limited service life of the paint resulting in the loss of definition of the island.

While I strongly support cost saving measures on our projects, positive and lasting traffic islands are essential to the safe operation of at-grade intersections.

When raised islands are installed, highway lighting should be considered to illuminate the entire island. The level of illumination should be sufficient to alert motorists to the presence of this traffic control feature. This is in addition to reflectorized end of island signage.

On light volume roads, the use of reflectorized end of island signage may be considered without illumination.

JED:slh

Breakaway Posts

4" x 6" wood post – needs 2 - 1 ½" holes drilled at 4 inches and 18 inches above ground level perpendicular to the traffic. Post should be installed with 6 inch length parallel to the roadway.

6" x 6" wood post – needs 2 – 2 inch holes drilled at 4 inches and 18 inches above ground level perpendicular to the traffic.

4" x 4" wood post – no modifications needed

U-channel post – must be 2.5 lbs foot. Cannot be doubled up.

U-channel post can hold a sign < 4 square feet

4 x 4 post can hold 4 square feet to 8.99 square feet

4 x 6 post can hold 9 square feet to 15.99 square feet

6 x 6 post can hold > 16 square feet

All signs wider than 60 inches shall be mounted on two wood posts.

Tripod signs:

Old standard: 36 inches to the bottom of the sign.

New Standard: 18 inches or 5 feet.

5 foot standard to be used on the interstate.

Access Management:

New driveways must first get approval from the maintenance division with jurisdiction over the driveway. All driveways must be permitted and checked for sight distance and other standards.

Portable Message Signs:

No non-work related messages. That means patriotic messages, political messages or even "Have a nice day".

Portable Message Signs should be visible for (½ mile). Message should be legible for a minimum distance of (650 feet). The entire message should be able to be read twice at the posted speed.

STATE OF MAINE
Maine Department of Transportation
Inter-Departmental Memorandum

Date : 12/23/99

To: Marc Guimont

Dept.: Transportation

From: Bruce A. Ibarguen

Dept.: Transportation

Subject: MDOT's Striping Program & Policy

The following is a brief summary of our "current" policy regarding which roads are to be included in our annual striping program.

Centerline Policy

- All routed highways (state & state aid) regardless of AADT receive a centerline every season (yellow-centerline). This covers 5,800 miles of road.
- All other highways (state-summer maintained) receive centerline only if the AADT is greater than 600. This amounts to approximately 1,100 miles of road.
Exception (adopted in 1999): roads with AADT less than 600 which are overlayed are painted once, but are not made a permanent part of the program.
We estimate this amounts to 100 miles annually.
- The total mileage of roadway which does not receive a centerline, due to low AADT, amounts to 1,300 miles. However, not all of this highway qualifies for a centerline due to width constraints (less than 18 feet), or condition (unacceptable pavement). Therefore, the total "eligible" mileage considering all factors is about 500 miles.

MDOT is responsible for approximately 8,300 miles of public highway. We stripe a centerline on 7,000 miles every year. There are about 500 more miles which could/should be striped.

Edge line Policy

- State - maintained routed highways with an AADT of 2,500 and above receive an edge line every 2 years.
- State - maintained routed highways with an AADT of 500-2500 receive an edge line every 3 years.
- Non-routed state highways with an AADT greater than 600, which have received an overlay, and with a pavement width of 28 feet, receive an edge line every 2 years.

Note: Edge line on all "controlled-access" highways is done every year (i.e. Interstate, Portions of Route 1, etc.)

- 1999 - Total miles of edge line was 3,123.
- 2000 - Total programmed edge line mileage is 3,600.

In 1997, we had \$2,500,000 to complete the striping program. This was increased to \$2,975,000 in 1999. Therefore, we did 750 more miles of roadway edge line, and 1150 more miles of centerline. This included all level 3 construction projects, changing some edge line striping from a 3 year to a 2 year cycle, and almost all of the maintenance overlayed projects.

In 2000, with the addition of the new striper, and the increase in budget to \$3,175,000, we will increase the program again. 500 more miles of edge line, and the 500 miles of roadway (low AADT) identified above will be included in this program. That is, in 2000 we will centerline (yellow) stripe all 7500 miles of eligible highway and all routed highways will begin receiving an edge line on a minimum 2 year cycle.

We allow the Division Engineers to use their discretion in the choice of where pavement markings are placed. (e.g. If a road is to be paved in a following year, then the D. E. may eliminate the edge line striping and apply the mileage to another roadway.)

NO PASSING ZONES

SCHOOL ZONES

The school zone itself, from sign to sign shall be striped no passing.

INTERSECTIONS

Maine state law (section 2070 paragraph 5b) states that you can not pass to the left when approaching within 100 ft of or traversing an intersection or railroad grade crossing, except when turning to the left to enter and intersecting way.

****(right now we stripe no passing for a minimum of 200 ft approaching an intersection. is this enough or should we use sight distance for the speed at intersection?)

NEW ZONES

All complaints shall be looked at by the DTE'S and the decision made by them! Any changes will be diagrammed on paper and sent in to the traffic office so that changes may be made to the master inventory books.

CONSTRUCTION PROJECTS

any striping or stencil changes made because of reconstruction must be looked at by DTE's and changes sent to the traffic office so changes can be made to the inventory books.

PAVEMENT MARKING EXTENSIONS THROUGH INTERSECTIONS

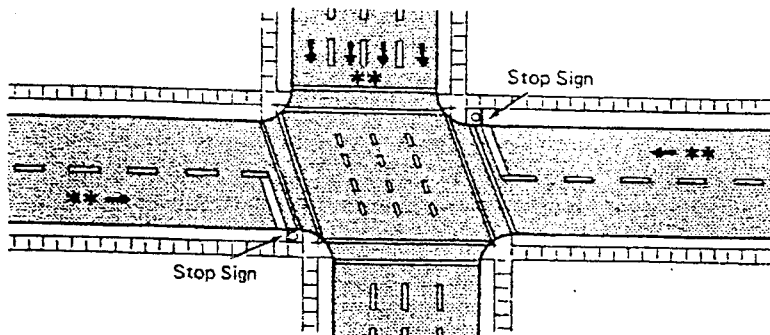
Sections 3b-7 of the mutcd allows for this and the DTE'S can make the decision as to when and where it is needed.

3B-7 Pavement Marking Extensions Through Intersections or Interchanges

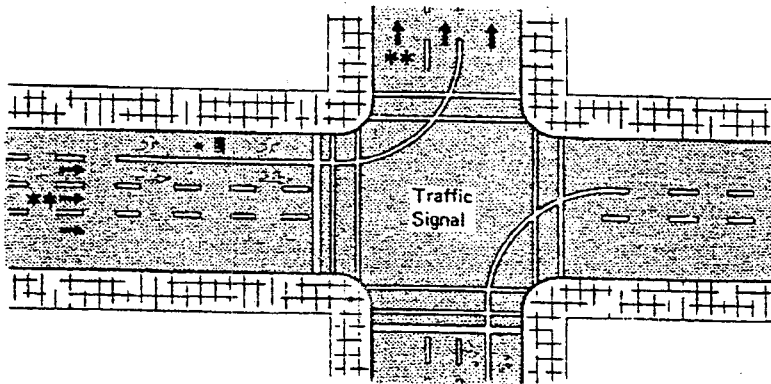
Where road design or reduced visibility conditions make it desirable to provide control or to guide vehicles through an interchange or intersection, (such as at offset, skewed, complex multi-legged intersections or where multiple turn lanes are used) a dotted line may be used to extend markings as necessary through the interchange or intersection area (figs. 3-9a, 3-11). Where a greater degree of restriction is required, solid lane lines or channelizing lines may be continued through intersections. A frequent use for the channelizing line is to separate turning movements (figs. 3-9b, 3-9c). SEE NEXT PAGE

Figure 3-9 Typical pavement marking applications.

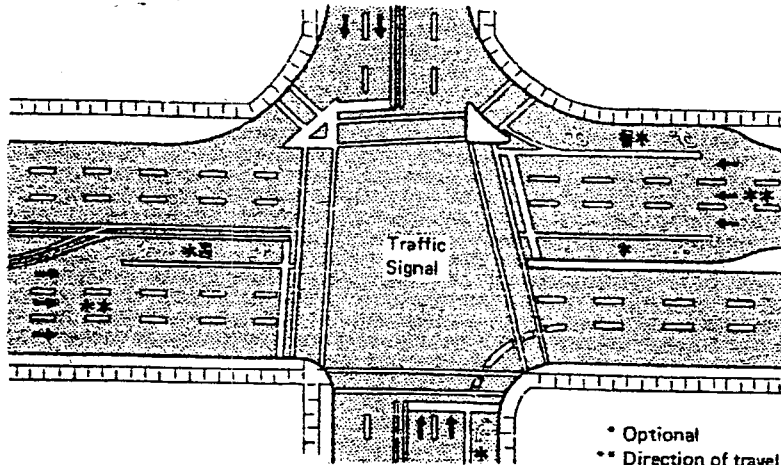
a—Typical pavement marking with offset lane lines continued through the intersection and optional crosswalk lines and stop limit lines.



b—Typical pavement marking with optional double turn lane lines, lane-use turn arrows, crosswalk lines, and stop limit lines.



c—Typical pavement marking with optional turn lane lines, lane use turn arrows, crosswalk lines, and stop limit lines.



• Optional
** Direction of travel

BREAKING CENTERLINE AND EDGE LINE FOR INTERSECTIONS

This shall only be done at established intersections, for example: year round maintained roads, state routed highways, state aids, town ways. This does not mean private drives, businesses, or State maintenance lots.

STRIPING STATE AID ROADS THAT DONT MEET ADT

Roads like ones going to the borders, school, or state parks. it seems every year some of these get striped but they are not on our program.

****should they be put on the program? should all of them be done or just some of them?

STRIPING ROADS THAT ARE NOT ON OUR PROGRAM

Only the roads that are on the lists sent to the crew supervisors will be striped. no roads not on the list shall be striped without approval from the traffic office.

EXEMPT RAIL ROAD CROSSINGS

No rail road crossings that are signed exempt will be stenciled.

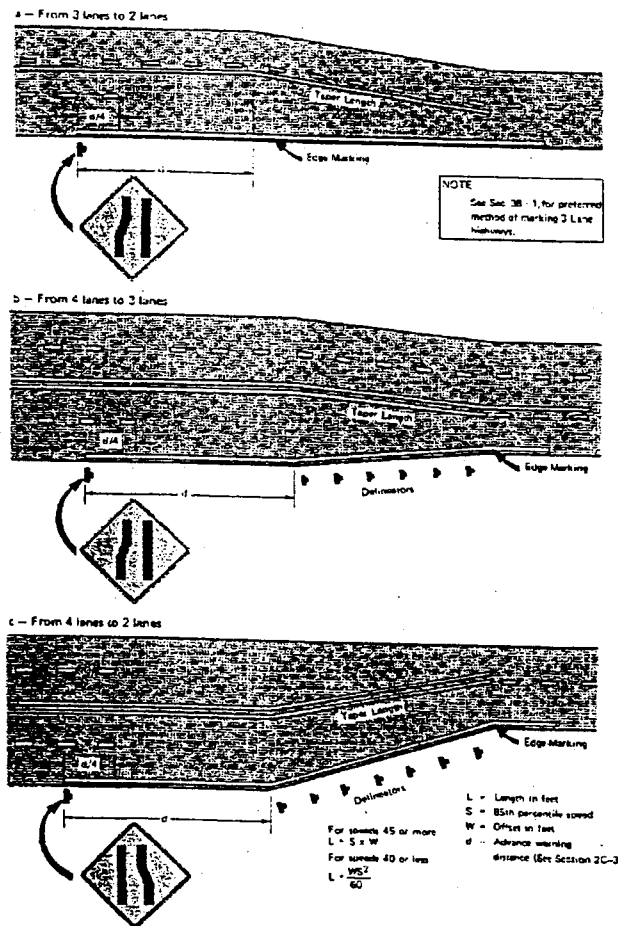
TRUCK LANES

ending striping for truck lanes.

according to the muted the following list of speed limits have the correct distance next to them for the distance from where to end skips to the beginning of the taper.

| | |
|--------|--------|
| 35 mph | 300 ft |
| 40 mph | 356 ft |
| 45 mph | 413 ft |
| 50 mph | 469 ft |
| 55 mph | 525 ft |

Figure 3-10 Typical lane reduction transition markings and signs.



STRIPING GUIDELINES

State routed highways (outside of cul's)

edge line

2500 adt and above every 2 years

500 adt and above every 3 years

centerline

all every year

state aid (inventory roads)

centerline

600 adt and above every year

paint application

| | |
|--------------------|-----------------------|
| 4" line at 15 mils | 16 ½ gallons per mile |
| 6" line at 15 mils | 24 ½ gallons per mile |
| 4" line at 13 mils | 14 ¼ gallons per mile |
| 6" line at 13 mils | 21 ¼ gallons per mile |

bead application

beads to be applied at the rate of 8 pounds per gallon of paint

new overlay projects

all new overlays will be striped centerline and every effort will be made to put the edge line back on only the section overlaid before the striping season is over.

all lay out of these projects is to be done by the paving technician before any striping will be done. lay out of turning lanes and arrows should be done by thedtes before any pavement markings can be done.

ADDING NEW STENCIL PROJECTS

To add new stencil projects including those added due to construction projects to the pavement marking program, DTE's shall send in a sketch showing what is to be painted and location to the traffic office. (DTE's prior approval from the traffic office to do this is not required.) Once the sketch has been received it will be added to the books and sent on to the pavement marking crew supervisor to be done.

PAVEMENT MARKINGS AT SIGNALS

Any signal inside a compact we do not maintain or do pavement markings at.

Any signal outside a compact that is not a state project we do not maintain or do pavement markings.

Signals that we do not maintain but are outside compacts, we do pavement marking on, unless we have an agreement with the town for them to do the markings.

All signals we maintain we do pavement markings at.

ROUTED HIGHWAYS

EDGE LINE

2500 ADT AND ABOVE EVERY 2 YEARS
500 ADT AND ABOVE EVERY 3 YEARS

WIDTH OF 20 FT OR LESS NOT TO BE PAINTED

ROUTED HIGHWAYS

CENTER LINE

ALL ROUTED EVERY YEAR

STATE AID

CENTER LINE

600 ADT AND ABOVE EVERY YEAR

SECTION H

References

AASHTO

- ☒ A Policy on Geometric Design of Highways and Streets
- ☒ Guide for Design of Pavement Structures
- ☒ Highway Drainage Guidelines
- ☒ Guide for Roadway Lighting
- ☒ Roadside Design Guide
- ☒ Highway Safety Design and Operations Guide

Transportation Research Board (TRB)

- ☒ Highway Capacity Manual
- ☒ Special Report 214, Designing Safer Roads, “Practices for Resurfacing, Restoration, and Rehabilitation”

Institute of Transportation Engineers (ITE)

- ☒ Traffic Engineering Handbook

FHWA

- ☒ Manual of Uniform Traffic Control Devices (MUTCD)
- ☒ Older Driver Highway Design Handbook

ADA

- ☒ Federal/Register, June 20, 1994, Interim Final Rules, 36 CFR-Part 1191 Architectural and Transportation Barriers Compliance Board, 23 CFR Part 700 – ROW, 49 CFR Part 24 Uniform Act, and 23 MRSA Sections 61-161